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BRITISH DENTAL JOURNAL

The Journal of the British Dental Association

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ORIGINAL COMMUNICATIONS

THE MEASUREMENT OF CARIES SUSCEPTIBILITY

By D. JACKSON, B.D.S.Manc.

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The broadest measure of caries susceptibility consists of classifying according to the presence or absence of dental caries. This classification has often been used but the division obviously serves little purpose when over 90 per cent of most civilised communities fall into the susceptibility category. Of greater importance and value is the measure of tooth incidence, the unit of such a measurement being " one carious tooth " whether the lesion is incipient, multiple or extensive. So long as the diagnosis is correct this unit is absolute and true.

The presentation of aggregates and divisions of this unit has been made in many devious ways leading to much confusion in the mind of the student wishing to analyse and assess the whole mass of presented clinical data. Aggregates have been expressed as the actual number of carious teeth, as the percentage or average number of carious teeth and by the D.M.F. index : divisions have been expressed by the A.C.F. index of Mellanby, the A.C.F. index of Marshall Day, the A.C.V. index of Knowles, the Bodecker indices of 1931 and 1939, the index of Winkler and Dirks and by the number of D.M.F. and D.F. surfaces. A more recent index is that used by Stones and Lawton. In most cases personal preference rather than logic has determined the use of degree indices, without obvious justification.

The nature of the required information should be the main factor in the choice of an index to measure caries susceptibility. The information usually required can be classified for the purpose of this discussion, as can the types of investigations necessary to provide this information. Since one is dependent on the other, it is more convenient to consider them together and classify in the first place the types of investigations.

Such a classification is as follows :

Type I Investigation

The required information : " The total past caries incidence and degree experience of a particular community."

This is the simplest of observational investigations. It involves one inspection in which the past caries experience must be determined, and hence it may be referred to as a " Static Survey." Every tooth which is or has been carious whether filled or extracted because of caries must be taken into account. Such investigations are carried out to determine the normal caries susceptibility of a given community, or to study the relationship between a lifelong environment and the incidence and degree of dental caries.

Examples of this type of investigation are : Weaver (1944) ; Arnold (1943) ; Knowles (1948).

Type II Investigation

The required information : " The rate of increase of caries incidence and degree in a given community during a specified period of time."

This type of investigation can be observational or experimental. If observational it concerns the study of the normal rate of increase of caries incidence and degree, and if experimental the effect of a given environment for a specified period of time on caries progress. The experimental survey, of course, requires the use of a control group or quadrant.

Examples of this type are : Whyte (1943) ; McBeath and Verlin (1942) ; Arnold Dean and Singleton (1944).

Type III Investigation

The required information : " The rate of increase of caries incidence and degree in a community over a relatively long period of time."

This is a serial type of survey involving periodical examinations. It has a particular value

in that the effect of an environment naturally present (observational investigation) or artificially applied (experimental investigation) can be fully studied. It permits the definition of an optimum value, or permanent value of any environment, if such values exist. Klein and Knutson (1942) is an example of this type of investigation.

Type IV Investigation

The required information : " The relationship of caries susceptibility to certain specific factors associated with individual teeth."

This type of investigation is used in relating specific factors such as hypoplasia, fluorosis, morphology, etc., to caries susceptibility. In such instances the units studied are individual teeth with certain attributes, and not dentitions as is the case in other types of investigations.

Examples are : King (1944) ; Mellanby (1948).

Although this classification is broad, it suffices for the majority of experimental and investigational purposes and for discussing the application of various measures of caries susceptibility.

It will be noted that a differentiation has been made between caries incidence and caries degree. Caries incidence is the more important factor, but the rate of progress of a carious lesion is also valuable information if it can be obtained. The basic information in experimental surveys is the answer to these questions :

(1) Does environment X reduce or increase the incidence of dental caries ?
(2) Does environment X arrest, reduce or increase the normal rate of progress of caries already present ?

In static surveys the basic information is concerned with whether community A has a greater or lesser incidence and degree of dental caries than community B. It may also be concerned with the incidence and degree of caries in teeth with specific attributes (Investigation Type IV).

The nature of the required information largely determines the nature of the index. With these facts in mind it is necessary to determine which index or indices most satisfactorily measure caries incidence and degree.

The Measurement of Caries Incidence

It has previously been stated that the most useful unit of measurement is " one carious tooth," which is a measure of caries incidence. This unit can be expressed as a percentage or as an average, but such an index for experimental or observational surveys concerning dentitions (as opposed to individual teeth) is of little value. In a community where dental treatment has been given, such an index would be comparatively low even if the susceptibility was high.

The percentage or average number of carious teeth can only satisfactorily be used for investigations of Type IV in which individual teeth are concerned. Thus, in determining the relationship between hypoplasia and caries, one must assess the number of hypoplastic and carious teeth against the number of structurally sound carious teeth.

To assess the caries susceptibility of a community, regardless of the extent of dental treatment, past history must be considered. It was for this reason that Klein and Palmer introduced their D.M.F. index—which means decayed, missing and filled teeth. Those missing are presumed to have at one time been carious. This assumption is considered to entail such a small error as to be negligible especially in the younger age-groups. The only teeth lost, other than because of caries, are those accidentally lost, those extracted in the course of orthodontic treatment and those congenitally absent. In a recent survey of 1,000 school children of mixed ages accidental loss accounted for four incisor teeth ; orthodontic loss, as far as could be determined, accounted for 16 first permanent molars and 6 premolars. Considering the probability that the first permanent molars were co-incidentally carious, the assumption concerning missing teeth will at once be seen to be negligible. Congenitally absent teeth are infrequent, and can be ignored. The errors in diagnosis would be greater than the error caused by the assumptions stated.

Filled teeth are similarly assumed to have at one time been carious, and in a community in which " preventive filling " is not practised, such an assumption is justified.

At the age when teeth are missing because of other reasons, such as parodontal disease, the D.M.F. index loses its accuracy and cannot safely be used. For younger age-groups, however, the D.M.F. measures caries susceptibility with a very high degree of accuracy, and its simplicity, clarity and logical appeal commend it without hesitation for universal acceptance.

It is applicable in every type of investigation or experiment except Type IV investigations when the past history of the attributes being investigated is not known, or in investigations which are of insufficient duration to produce any significant change in the index.

In Type IV investigations it is suggested that the index used to be called the D.F. index, a procedure which would be clear and standard. The results could then be expressed as the number or percentage number of D.F. teeth.

Klein and Palmer (1938) devised the D.M.F. index purely for the permanent dentition, it being considered that there could be no satisfactory index for deciduous teeth when exfoliation renders past history impossible to assess.

In the Department of Preventive Dentistry, Manchester University, the author has modified the D.M.F. index for use with deciduous teeth. The index is differentiated to d.m.f., the initials having exactly the same meaning as in the parent index.

This index can be used for a full mouth dentition from three to five years inclusive and for deciduous molars from three to eight years inclusive.

At the age of five years, however, the deciduous incisors begin to exfoliate. Upper incisors have already exfoliated to the extent of about 7 per cent and lower incisors to about 16 per cent. It can be calculated from the percentage incidence of caries in these teeth that the actual error in the total score caused by excluding exfoliated lower incisors would be about 0·03 per cent and that caused by excluding exfoliated upper incisors would be about 0·3 per cent. To include them in the score would involve a possible error of 1·5 per cent and 4 per cent respectively.

At this age therefore the d.m.f. excludes all missing incisor teeth. For the other ages, three and four years, all missing teeth can safely be assumed to have at one time been carious.

Between and including the ages of three and eight years all missing deciduous molars can safely be assumed to have at one time been carious. Canines are not included because they are prone to a premature exfoliation in a sound condition.

In static surveys, the D.M.F. has been mainly expressed as an average per mouth, such as 3·45 or 2·56 D.M.F. teeth per mouth. In this form the index has only a relative meaning, since, quite obviously, one cannot have 0·45 carious teeth. Several workers have used the Caries Attack Rate, which is the D.M.F. per 100 children. The above averages 3·45 and 2·56 would then become 345 and 256 which do have definite meanings. This is only a mathematical conversion devised to give a more workable and understandable figure.

Caries Degree Measure

The translation of a clinical picture into numerical form is difficult, and it must be realised that the D.M.F. index makes no differentiation between incipient and gross caries. Taking extremes, a D.M.F. of 10 may mean 10 teeth each having an incipient lesion, or 10 teeth decayed to their roots. The clinical pictures are widely variant although the D.M.F. index is the same. In an attempt to differentiate between such clinical pictures several degree indices have been devised. Such a differentiation, if possible, would seem to be highly desirable.

The principle of a degree measurement is the arbitrary division of a tooth surface or volume and the scoring of the cavity according to the defined scale. The first difficulty is to define the arbitrary divisions in such a way that they are clinically discernible and that each scale interval has the same value. The second difficulty is that it is impossible in many cases to determine clinically the extent of undermining caries : a tooth one day may have a low score and the next day a high score due to mechanical fracture without any increase in caries.

Shepherd (1945) suggested that caries progression in a tooth could be observed by casting the shadow of a radiograph on to graph paper. The progress, even if it could accurately be observed, would only be in one plane and the suggestion is of little value.

Gilda and Goldberg (1948) claimed that the volume of an approximal cavity could be obtained by noting the area cast by a radiograph from the formula $V = A^{1.5}$ where V is the volume and A the area.

The unreliability of the radiological determination of dental caries, and the errors entailed in tracing the shadow outline of the area, together with the doubtful accuracy of the formula, combine to render the method of little value and impracticable for a long-term clinical investigation.

If caries degree is to be measured at all, it must be measured clinically by an index capable of providing the desired information. The criteria of such an index are :

(1) It must be simple and sufficiently clear in definition in order to allow different observers to obtain comparable results.
(2) It must be biologically sound in that each scale interval must, as near as possible, be of equal value.
(3) It must possess sufficient sensitivity for the practical need.
(4) It must provide the desired information.

Whether an index satisfies the third criterion can only be determined by using the index and noting the limits of the range which naturally exist.

It is intended to assess the degree indices which have been used, having in mind the above criteria. Such indices are :

(1) The A.C.F. index of Mellanby.
(2) The A.C.F. index of Marshall Day.
(3) The A.C.V. index of Knowles.
(4) The Bodecker index of 1931.
(5) The Bodecker index of 1939.
(6) The index of Winkler and Dirks.
(7) The index of Stones and Lawton.
(8) The Surface index.

The A.C.F. Index of Mellanby.—The Average Caries Figure (A.C.F.) is defined as follows :

$$\text{Average Caries figure} = \frac{\text{Total Caries Figure (T.C.F.)}}{\text{Total number of erupted teeth}}$$

The T.C.F. is derived as follows :

(1) One point is allotted to slight caries, i.e. very early and suspected fissures and approximal cavities.
(2) Two points are allotted to moderate caries involving destruction of up to roughly a quarter of the tooth crown including undermining caries.
(3) Three points are allotted to advanced caries with destruction of more than a quarter of the tooth crown, including undermining caries. In this category are also included roots of decayed teeth and all teeth which are assumed to have been extracted for caries.

This index is comparatively simple and easy to understand but the scale intervals are not of uniform progression, and thus, each numerical unit does not even roughly measure the same quantity.

Bodecker (1939) has criticised this index on the grounds that a quarter of a tooth crown depends on an individual judgment, making it difficult for other workers to obtain comparable results.

Another criticism is that extracted teeth receive the maximum score, and this assumption does not seem justifiable in view of the fact that the average score for such teeth must surely be below the maximum.

Apart from these initial criticisms, however, the expression of this scale as the Average Caries Figure is illogical because there is no connection between the number of erupted teeth and the degree of caries.

The fallacy of this expression is at once seen if its application to mixed dentitions is considered. If the progression of caries in the first permanent molars of a child from the age of 6 to 10 years inclusive is studied, several anomalies are noted. The following is the charting of a hypothetical case :

Age						*A.C.F.*
6 years	6 (1)				6 (1)	$\frac{4}{4} = 1$
	6 (1)				6 (1)	
7 years	6 (2)	1	1		6 (2)	$\frac{8}{10} = \cdot 8$
	6 (2)	21	12		6 (2)	
8 years	6 (3)	21	12		6 (3)	$\frac{12}{12} = 1$
	6 (3)	21	12		6 (3)	
9 years	6 (3)	4 21	12 4		6 (3)	$\frac{12}{16} = \cdot 75$
	6 (3)	4 21	12 4		6 (3)	
10 years	6 (3)	54 21	12	45	6 (3)	$\frac{12}{20} = \cdot 6$
	6 (3)	54 21	12	45	6 (3)	

The figures in parenthesis are the caries score obtained from the above scale.

In this case the first permanent molars decay at a gradually progressive rate and attain the maximum score at the age of 8 years. At the age of 7 years the A.C.F. has dropped, although the degree of caries has increased : at the age of 8 years the A.C.F. is the same as at the age of 6 years, although the degree of caries is much greater. From 9 to 10 years, the A.C.F. decreases, although the degree of caries remains the same.

This anomaly is due to the fact that the A.C.F. not only depends on the increase of caries, but inversely on the number of teeth erupted which is unrelated to the degree of caries.

For these reasons, very serious criticisms are levelled against the work of Whyte who used the A.C.F. index in experimental work on children during the period when the permanent teeth were erupting.

Mellanby has several times used the index to determine the extent or degree of caries in 5-year-old London school children. Full dentitions were not used but the degree and incidence were determined for all and individual teeth. From the definition of the A.C.F. index this is perfectly legitimate, but the fundamental fallacy of this index is that the Total Caries Figure is divided by the total number of non-carious and carious teeth including those missing or filled. Whereas the numerator is concerned with carious teeth, the denominator includes carious and non-carious teeth.

If each tooth suffered an average of X degrees of caries (X being obtained by dividing the Total Caries Figure by the number of D.M.F. teeth) the A.C.F. index can be considered as follows :

$$\text{A.C.F.} = \frac{\text{X (Total number of carious* teeth)}}{\text{Number of sound teeth and number of carious teeth*}}$$

(*Carious Teeth includes those missing or filled teeth)

$$= \frac{X\ C}{S + C}$$ (where C is the number of carious teeth and S the number of sound teeth)

$= \frac{X}{100}$ Percentage of incidence of carious teeth

This reduction clearly shows that with a constant average degree of caries, X, the A.C.F. index depends on the percentage incidence of caries, and, consequently, does not truly measure caries degree. In fact the logical measure of caries degree is considered to be the $\frac{T.C.F.}{D.M.F.}$ which is the average degree of caries per carious tooth.

It has been shown that the A.C.F. index cannot be used for dentitions during the period of exfoliation and eruption, and also that it does not truly measure the degree of caries present in carious teeth. For stable dentitions, at the age of 4 and 5 years for deciduous teeth and 12 years plus for permanent teeth, the number of erupted teeth is constant in each case, and, consequently, the problem of dividing the T.C.F. by the number of erupted teeth does not arise.

If the T.C.F. is left in its basic form, however, the numerical representation of the clinical picture is as incomplete as when the D.M.F. alone is used. A T.C.F. of 12 may mean twelve carious teeth each having one point degree, or four teeth carious to their roots. The T.C.F. should in some way be related to the D.M.F. If the average T.C.F. per carious tooth is determined (i.e. $\frac{T.C.F.}{D.M.F.}$ of the value previously mentioned) the values for the two extreme cases cited would be 0 and 3 respectively which does give some indication of caries degree.

Excluding, for the time being, all general criticisms of degree indices and specific criticisms concerning the scale used, it would appear as a general principle for degree indices that the total score obtained from the prescribed scale should be divided by the D.M.F. to give an indication as near as possible to the degree of caries suffered by the carious teeth. This would seem to be a logical process, but whether such a method would be of practical value will be discussed when all the degree indices have been considered.

The A.C.F. Index of Marshall Day.—This index is different from that used by Mellanby. The scale is different and in this case the A.C.F. is obtained by dividing the Total Caries Figure by the number of mouths examined.

The T.C.F. is obtained as follows :

(*a*) 1 point is given to initial caries including softened, discoloured or defective pits and fissures, approximal caries (subsequently verified by X-rays) but nor freely accessible, and small carious points in any part of the tooth.

(*b*) 2 points are given to freely accessible approximal caries and small open cavities involving less than a quarter of the tooth.

(*c*) 3 points are given to more extensive caries involving more than a quarter and less than two-thirds of the crown.

(*d*) 4 points are given to caries involving from two-thirds to complete destruction of the crown, and all extracted teeth.

Most of the criticisms of the Mellanby scale apply to this scale although the fundamental fallacy of the Mellanby A.C.F. index is not made.

The criticism which Bodecker made about the Mellanby index applies with greater force because, with Day's index, one is called upon to determine not only a quarter of the tooth crown but also two-thirds. The definition of freely accessible cavities is vague and to judge visually whether an open cavity or several open cavities constitute less than a quarter of the tooth is at times not possible. A cavity with a small opening may have extensive undermining caries the extent of which it is impossible to determine by visual methods alone. This, of course, is a general criticism of all degree indices.

The A.C.V. Index of Knowles.—The average caries value is derived by dividing a Total Caries Figure by the number of cases.

$$\text{A.C.V.} = \frac{\text{T.C.F.}}{\text{Number of cases}}$$

The Total Caries Figure is obtained from a scale defined as follows:

(*a*) 1 point is given to carious enamel lesions which can be detected by a probe, and suspected fissures in molar teeth.

(*b*) 2 points are given to small to medium cavities involving less than a quarter of one tooth surface.

(*c*) 3 points are given to cavities involving two tooth surfaces, but less than a quarter of the crown of the tooth.

(*d*) 4 points are given to extensive caries involving more than a quarter of the crown of the tooth.

(*e*) Missing teeth are given 4 points.

The expression of the A.C.V. index is quite different from that of the Mellanby A.C.F. index, and, consequently, the fallacy of dividing the total caries figure by the total number of teeth, carious and sound, is avoided.

The main objection to this index is that the scale is illogical and vague in definition.

If a tooth is considered with all its fissures carious, a cervical cavity involving less than a quarter of the surface and an approximal cavity just involving either the lingual or buccal

surface, such a tooth by definition would receive 1 point for the occlusal surface, 2 points for the buccal surface, 3 points for the approximal surface, making a total of 6 points. This is against the non-accumulative principle since only 4 points are given to a cavity involving more than a quarter of the tooth crown: the hypothetical case could involve much less than a quarter of the tooth crown.

A tooth with a small approximal cavity just involving the buccal surface would receive 3 points yet a tooth with all fissures carious, a buccal pit cavity and an approximal cavity confined to one surface would at the most receive 2 points by definition.

The vague definitions and lack of accumulative principle make this index difficult to repeat, and can give rise to anomalous results in which one tooth with a greater degree of caries can receive a smaller score than one with a lesser degree.

The Bodecker Index, 1931.—Bodecker and Bodecker in 1931 introduced a new Caries Index to determine caries degree. Only 20 teeth are considered. Canines and lower incisors are excluded because of their relatively high resistance to caries, and wisdom teeth are excluded because of their variability in eruption and alignment. From the 20 teeth, 100 susceptible surfaces or zones are designated and 1 point given to each surface or zone involved by caries.

The surfaces are as follows:

(*a*) *Upper Incisors* (4 *Points*)
(1) and (2) Approximal surface (mesial and distal).
(3) Labial surface (gingival margin).
(4) Incisal edge.

(*b*) *Upper Premolars* (4 *Points*)
(1) and (2) Approximal surfaces (mesial and distal).
(3) Buccal surface.
(4) Occlusal surface.

(*c*) *Upper Molars* (6 *Points*)
(1) and (2) Approximal surfaces (mesial and distal).
(3) Buccal surface (gingival margin).
(4) and (5) Occlusal surface (mesial and distal pits).
(6) Lingual pit.

(*d*) *Lower Premolars* (5 *Points*)
(1) and (2) Approximal surfaces (mesial and distal).
(3) Buccal surface (gingival margin).
(4) and (5) Occlusal surface (mesial and distal).

(*e*) *Lower Molars* (6 *Points*)
(1) and (2) Approximal surfaces (mesial and distal).
(3) Occlusal surface.
(4) Buccal pit.
(5) Buccal surface.
(6) Lingual surface.
Lost teeth are given 3 points.
Fully crowned teeth are given 3 points.
Re-decay is considered to be due to faulty fillings and not recorded unless caries is obviously very active in the mouth, and new surfaces are involved.

There are certain criticisms of the index as pointed out by Day and Sedwick (1935). It was discredited because lingual caries in incisors is more frequent than the involvement of the incisal tip. They claim that the approximal surfaces of canines are much more prone to decay than the buccal surface of the inferior premolars, and also inferior incisors although more rarely affected than other teeth are subjected to decay sufficiently to affect materially, at times, the susceptibility figure for individual mouths.

Apart from such criticisms it does not seem logical to give only 1 point to the occlusal surface of the upper premolars and 2 points to the occlusal surface of the lower premolars. Again, involvement of the lingual surface of a lower molar increases the index by 1 point. The only zone considered on the lingual surface of the upper molar is the lingual pit.

This index is mainly a zonal index, as a result of which a deep occlusal cavity in a lower first permanent molar receives only 1 point, and a similar tooth with incipient central and buccal pit lesions receives 2 points. The number of surfaces involved is not necessarily an indication of the degree of caries. It is possible to conceive a tooth with incipient caries on all surfaces, thus receiving 5 to 6 points according to the tooth, and yet an extremely deep cavity involving one surface only receives 1 point.

Although the definition is clear the index is complicated and seems to have been influenced by a desire to determine a round number of 100 surfaces regardless of the natural necessity.

The Bodecker Index, 1939.—To overcome the accepted objections to the previous index, C. F. Bodecker, in 1939, introduced a modified caries index. He included all 32 teeth and rearranged the susceptible zones so that there were 180 instead of 100.

Each tooth is considered to have five surfaces: (1) Mesial; (2) Distal; (3) Buccal or Labial; (4) Lingual; and (5) Occlusal or Incisal.

Each surface with one or two exceptions is considered to be a susceptible area. The exceptions are the occlusal surfaces of the upper molars, the lingual surfaces of the upper first and second molars, the occlusal surfaces of each lower premolar, and the buccal surfaces of the lower molars.

The reasons for the exceptions are :

(1) The occlusal surface of the upper molars have two well-defined susceptible areas separated by a ridge of enamel, viz. the mesio-buccal and disto-lingual fissures.

(2) The lingual surfaces of the upper first and second molars have two susceptible areas, viz. the lingual pit and the cervical margin.

(3) The occlusal surface of the lower premolars have two susceptible zones, viz. the mesial and distal pits.

(4) The buccal surface of the lower molars have two susceptible zones, viz. the buccal pit and the cervical margin.

To each of these zones 1 point is assigned thus making a total of 180 surfaces.

Bodecker says that approximal surfaces of premolars and molars must occasionally be assigned 2 points because when cavity preparation is effected the occlusal surface is very often involved. Thus, an approximo-occlusal filling is given 2 points, being an increase over the original condition. Fillings are, of course, included. Crowns are given 3 points. Extracted teeth due to caries are given 3 points.

These estimations were made on the opinions of experts specialising in extractions and in conservative treatment.

Although several objections to the previous index have been overcome, the main and fundamental criticism that a surface or zonal measurement does not necessarily indicate caries degree still remains.

Bodecker states that the index is particularly useful to estimate the increase of caries degree per 100 days if the period between examinations is not a standard one. This method was used by McBeath and Zucker, 1938.

This process would be legitimate if caries degree and time followed a straight line relationship, so that the unit increase per day was uniform. It is impossible to say whether this is true, and the assumption is not justified. It is highly likely that there is no such relationship between caries progression and time. A straight line relationship most certainly does not exist if caries is reduced in an experimental survey, and the results as presented by McBeath and Zucker cannot be considered to be of any value.

The Index of Winkler and Dirks (1946).—In an attempt to correlate the lactobacillus count and caries, Winkler and Dirks used an index which they stated to be a modification of Bodecker's 1939 index. This index was described as follows :

(1) Each cavity and each discoloration or decalcification which might be estimated as pre-carious was recorded as caries.

(2) Cavities extending to more than one surface were recorded on each of the surfaces affected.

Approximo-occlusal, resp. approximo-lingual, approximo-incisal and approximo-labial cavities in premolars, incisors and canines were only recorded once, as in most cases these cavities would have started from 1 point. On each surface only one cavity was recorded.

It is quite true that approximo-lingual and labial cavities in incisors and canines are most likely to have arisen from one lesion, but in premolars and molars it is impossible to say whether a compound cavity has originated from one or more lesions, and there is no justification for the differentiation made. Winkler and Dirks have, in fact, an index for incisors and canines, a different one for premolars and another for molars, but have joined them all together and called it a modification of Bodecker's 1939 index.

This index is neither a measure of lesion incidence, tooth incidence nor of caries degree. It is mixed index which can have no real interpretation and hence their claims that there is a near degree of correlation between the number of lactobacilli and the mean number of cavities cannot be taken to have been satisfactorily proved.

The Index of Stones and Lawton (1948).—Stones and Lawton devised an index specifically for an experimental investigation into the efficacy of topically applied and ingested sodium fluoride in reducing the incidence and degree of dental caries.

The scale of measurement was as follows :

A. 1 point was given where one or more cavities in the same tooth were detectable by a sharp probe or a bite-wing radiograph, where the lesion had not penetrated through the enamel to involve the dentine.

B. 2 points were given to a tooth with one or more cavities where the dentine was involved, but where the total loss of the crown was no greater than a quarter of the whole.

C. 3 points were given to a tooth with one or more cavities resulting in a total destruction of more than a quarter of the crown.

This index in its basic form is exactly the same as that devised by Mellanby, except that radiographs were used to aid the clinical diagnosis.

Stones and Lawton wished to express their index in such a way that it would show the annual increase in degree in all teeth, in teeth which were originally carious and in teeth originally non-carious.

For this purpose, and to avoid difficulties incurred when assessing changing dentitions, they expressed this index in the form of the Total Annual Caries Rate, the New Caries Rate (in teeth originally caries free) and the Old Caries Rate (in teeth originally carious).

These Rates were defined as follows :

(1) *The Total Annual Caries Rate*

$$\frac{\text{The change in the total caries score on teeth present during the whole of the year}}{\text{The number of teeth present at the end of the year}}$$

(2) *The New Caries Rate*

$$\frac{\text{The increase in caries score on teeth free from caries at the beginning of the year and present at the end of the year}}{\text{The number of teeth present at the end of the year}}$$

(3) *The Old Caries Rate*

$$\frac{\text{The increase in caries score on teeth already carious at the beginning of the year and present at the end of the year}}{\text{The number of teeth present at the end of the year}}$$

Teeth extracted or filled at the end of the year were counted as present, provided their caries score was recorded. Teeth lost during the year were excluded both from the calculation of the change in caries score as well as from the calculation of teeth present at the end of the year.

Apart from criticisms of the scale used there are very serious criticisms of the way in which these rates have been expressed. Although the rates were devised to avoid anomalous results during the period of dentition change, anomalous situations still arise which render the results of little or no value.

That this is so can be seen by considering several hypothetical, yet typical, cases. Case A is a child of 8 years with a dentition as shown : there is no caries. In twelve months' time two first permanent molars have become carious to the extent of 1 point each. The Total Annual Caries Rate is, therefore, 0·166.

CASE "A"

6	21	|	12	6	Twelve months	6^1	21	|	12	6
6	21	|	12	6	⟶	6^1	21	|	12	6

T.A.C. Rate $\frac{2}{12} = 0{\cdot}166$

If in an identical case as far as age, sex and caries progression are concerned the first premolars had erupted during the twelve monthly period, the T.A.C. Rate would have been $\frac{2}{16}$ or 0·125 (Case B).

CASE "B"

6	21	|	12	6	Twelve months	6^1	4	21	|	12	4	6
6	21	|	12	6	⟶	6^1	4	21	|	12	4	6

T.A.C. Rate $\frac{2}{16} = 0{\cdot}125$

It cannot be said that child " B " has suffered less caries than child "A." Both children are identical except in the number of erupted teeth, and yet the figure given denotes child " B " to be less susceptible than child " A."

If another child is taken (Case C) of the same age, sex and dentition, with extensive caries to the degree of 3 points in each of two first permanent molars and that at the end of twelve months' time the other two first permanent molars have become carious to the degree of 1 point each, the Total Annual Caries Rate is $\frac{2}{12}$ which is 0·166

CASE "C"

6^3	21	|	12	6	Twelve months	6^3	21	|	12	6^1
6^3	21	|	12	6	⟶	6^3	21	|	12	6^1

It could easily have been that the right permanent molars were extracted during the twelve monthly period. The Total Annual Caries Rate would then have been $\frac{2}{10}$ or 0·2, although the caries conditions are identical.

If by chance one premolar had erupted as well as the right molars extracted then the Total Annual Caries Rate would have been $\frac{2}{11}$ or 0·182.

Although the index was used in a half-mouth experiment these criticisms have exactly the same bearing.

It is seen that the index is quite erroneous, and the illogical conception upon which it is based is most likely responsible in part for the inconsistent results which were obtained.

The D.M.F. Surface Index.—The surface index is obtained by counting the number of surfaces involved by caries. By definition it is the simplest of degree measurements. Many investigators have presumably considered the index to be self-explanatory, and have not defined

it, but some have made it clear that they have used a D.M.F. surface index, in which each decayed, missing or filled surface is given 1 point. A missing tooth is given 5 points and a filled tooth is allotted a score according to the number of surfaces involved.

It has been previously stated that surface involvement does not necessarily indicate the extent of a carious lesion and that a tooth one day may have one surface involvement and the next day several, purely due to mechanical fracture. It is considered that this criticism alone, which has earlier been amplified in the discussion of other indices, is sufficient to justify the statement that the D.M.F. surface index is of doubtful value. It has been considerably used in investigations concerning the topical application of fluorides, and it is to be regretted that so many conclusions have been made from the use of this index.

Although it is not permissible to draw conclusions from data intrinsically unsound, a scatter diagram (diagram 1) relating D.M.F.

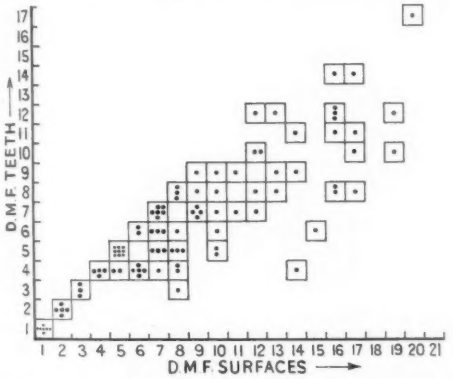

DIAGRAM 1.—A scatter diagram relating D.M.F. teeth to D.M.F. surfaces.

and surfaces shows that there is no relationship between the D.M.F. and surfaces. From the figures found in 100 12–13-year-old children a D.M.F. of 4 could mean anything from 4 to 8 surfaces : a D.M.F. of 5 anything from 5 to 10 surfaces, and a D.M.F. of 9 anything from 9 to 14 surfaces, etc.

It can be concluded that apart from not satisfactorily measuring caries degree, the surface index measures something which has no determinable relationship with caries incidence.

If in an experimental survey the number of D.M.F. surfaces is less than that in the control group, one would not know whether the reduction occurred in the number of lesions or in the spread of old caries.

Just as surface involvement does not accurately measure caries degree, neither does the surface involvement of a filling represent truly the size of the original cavity. The filling of an approximal cavity may involve four surfaces. The number of surfaces involved by caries in an extracted tooth is so variable and depends on so many factors that a satisfactory assessment is not possible.

Conclusions based on results of this index should be treated with reserve since they are not capable of a reliable interpretation.

Discussion

The measurement of caries incidence by the D.M.F. index is absolute and true provided that all the decayed teeth are correctly diagnosed and that all missing and filled teeth have at one time been carious.

The absolute number of carious teeth cannot be obtained by any clinical, radiographic, bacterial or chemical method, but the clinical method alone can provide a figure so close to the absolute, that it may be considered sufficiently accurate for the practical need. The assumptions made concerning missing and filled teeth have been shown to involve a negligible degree of error and it may be considered that the D.M.F. index provides a measure of caries incidence which is not only sound in principle but highly accurate in its practical applications.

The measurement of caries degree or the extent of progression of a carious lesion is less simple because of the fundamental difficulty of estimating the extent of undermining caries, except to a low degree of accuracy. Measurement can never be accurate in an absolute sense, but crude measurements can sometimes provide information of practical value. To determine the sensitivity of a degree measurement is more difficult because there is no adequate yardstick. Whether a degree index is satisfactory or not must be determined initially on the logical nature of its definition and secondly on the results of its use.

The logical nature of several degree indices have been discussed: some can be dismissed by such an analysis whereas others could conceivably give some broad indication of caries degree. Such indices are those of Mellanby and Bodecker.

In a static survey, Sandler (1940) found a high degree of correlation to exist between the D.M.F. and the 1939 Bodecker index.

Jackson (1948) has found in a static survey of 18-year-old naval recruits that a similar degree of correlation exists between the D.M.F. and the Mellanby index and also between the D.M.F. and the 1931 Bodecker index.

It is interesting that in spite of the stated objections to the Mellanby and Bodecker scales such a correlation exists.

In discussing the importance of these findings it is necessary to refer to the stated fallacy of the Mellanby A.C.F. index. This index has been shown to depend on the percentage incidence of caries, and, hence, does not truly measure the average degree (as measured by the Mellanby scale) of caries in carious teeth. From logical considerations, the average extent of carious lesions can only be determined by dividing the total carious score (by whatever scale is chosen) by the total number of carious teeth, viz. $\frac{\text{Total Caries Score}}{\text{D.M.F.}}$. This for purposes of discussion has been called the X value.

Mellanby does not use the D.M.F. index to measure caries incidence but uses the percentage incidence of carious teeth, for all and individual teeth. Nevertheless the X value can be obtained from the percentage incidence and the A.C.F. index from the formula:

$$X = \frac{100 \times \text{A.C.F.}}{\text{Percentage incidence of caries.}}$$

Table I consists of a partial reproduction of a table given by Mellanby (1948) showing the percentage incidence and the A.C.F. values.

TABLE I

Type of tooth	*% carious teeth*			*A.C.F*		
Upper jaw :	1943	1945	1947	1943	1945	1947
Central incisors ...	37·6	29·5	22·2	0·77	0·61	0·42
Lateral incisors ...	20·3	14·9	10·6	0·38	0·30	0·20
Canines	9·5	7·5	6·9	0·18	0·15	0·13
1st molars	42·0	38·9	30·6	0·95	0·83	0·65
2nd molars ...	56·5	51·4	34·4	1·17	0·95	0·64
Lower jaw :						
Central incisors ...	4·9	1·7	1·7	0·08	0·03	0·03
Lateral incisors ...	3·7	2·1	1·7	0·06	0·04	0·03
Canines	6·9	5·9	4·1	0·13	0·12	0·07
1st molars	54·0	48·6	43·3	1·29	1·10	1·00
2nd molars ...	61·0	58·8	43·0	1·42	1·27	0·95
Total	30·1	26·5	20·3	0·65	0·55	0·42

Figures taken from Mellanby's 1943, 1945 and 1947 Surveys of the teeth of 5-year-old London School Children.

Table II gives the X values calculated from these figures. Apart from the lower incisors, there is very little variation between the values for each tooth. Considering the values for all the teeth there is hardly any difference between the 1943 and 1947 values, in spite of the fact that the incidence of caries dropped from 30·1 per cent in 1943 to 20·3 per cent in 1947. One can only conclude from these figures that those factors which caused such a reduction in caries incidence did not alter the extent to which a caries lesion progressed, and Mellanby's statement that there was an improvement in the extent of caries between these years is based on a faulty premise.

TABLE II

Type of teeth	*X value*		
Upper jaw :	1943	1945	1947
Central incisors	2·08	2·10	1·90
Lateral incisors	1·87	2·00	1·90
Canines	1·88	2·00	1·90
1st molars	2·20	2·11	2·10
2nd molars	2·07	1·85	1·80
Lower jaw :			
Central incisors	1·60	1·77	1·90
Lateral incisors	1·62	1·90	1·90
Canines	1·88	2·03	1·80
1st molars	2·20	2·16	2·00
2nd molars	2·28	2·16	2·00
Total	2·15	2·08	2·07

X values calculated from Table I.

Table III gives the A.C.F. and calculated X figures taken from King's Isle of Lewis Survey 1938.

TABLE III

Primary schools	*King's Isle of Lewis Survey* *% Incidence of caries*	*Mellanby's A.C.F. index*	*Calculated X values*
Lewis	14	·3	2·1
Stornaway ...	33	·76	2·3
Mainland ...	34·7	·83	2·4

The X values calculated from King's figures show the independence of the incidence of caries and the degree of caries when measured by the Mellanby scale and expressed as the X value. The consistency of the degree (X) causes the A.C.F. index to run parallel to the percentage incidence figures which is a similar result to that obtained from Mellanby's findings.

Table IV gives the figures presented by Jackson for five groups of analogous D.M.F.,

TABLE IV

	Group I	*Group II*	*Group III*	*Group IV*	*Group V*
D.M.F.	154	154	156	155	158
B.I.	354	342	350	349	364
T.C.F.	313	319	319	315	350
X value B.I. ...	2·3	2·2	2·2	2·2	2·3
X value T.C.F. ...	2·03	2·07	2·04	2·03	2·2

together with X values for the Bodecker and the Mellanby scales. The X values for each scale remain remarkably constant. It will be observed that there is little numerical difference between the Bodecker X values and the Mellanby X values, suggesting that the Bodecker scale (with a maximum of 6 points for a tooth) is not appreciably more sensitive than the Mellanby scale with a maximum of 3 points for each tooth.

The most significant factor of Jackson's figures is that the Total Caries Figure of Mellanby and the Bodecker index give no further

information than the D.M.F. in a static survey. From Mellanby's figures it can be deduced that if the average X value for each type of tooth remains fairly constant (as is the case) then the Total Caries Figure runs parallel with the D.M.F and no further information is obtained.

The constancy of the X value (Table I) for 1943, 1945 and 1947 suggest that regardless of the incidence of caries, or regardless of mouth susceptibility a tooth, once it becomes carious, progresses on an average at a uniform rate, and that at the age of 5 years the average degree of caries is practically constant. It would appear that the extent of a carious lesion is mainly a question of time, although other factors conceivably play a part. Those people with rapid caries and those with slow caries are readily detected clinically, but by far the majority of cases seem to have a uniform rate of progression which is influenced little, if at all, by the general susceptibility to caries incidence.

Referring again to Jackson's figures, if the first 9 cases of the five groups are grouped together the total D.M.F. is 250. The rest of the cases have a total D.M.F. of 527, and consequently have a susceptibility of over twice that of the others. The total of the Mellanby and Bodecker scales together with the X values for these two new groups are given in Table V.

TABLE V

First Nine Cases from Each Group

Group	*D.M.F.*	*T.C.F.*	*B.I.*
1	50	93	102
2	50	94	102
3	50	97	105
4	50	94	104
5	50	102	107
Total	250	480	520

X Value T.C.F. = 1·92
X Value B.I. = 2·0.

Last Nine Cases from Each Group

Group	*D.M.F.*	*T.C.F.*	*B.I.*
1	104	220	252
2	104	225	240
3	106	222	245
4	105	221	245
5	108	248	257
Total	527	1,136	1,239

X Value T.C.F. = 2·15
X Value B.I. = 2·3

Although one group has over twice the incidence susceptibility of the other, the X values vary only slightly. The variation could be accounted for because of a higher percentage of missing teeth in the D.M.F. of the second group, but the main factor of significance is that these results are covered by the hypothesis that caries extent is mainly influenced by time, all these cases being of the same age. The consistency of the figures obtained from the use of the Mellanby and Bodecker scale suggest that they can be used within their acknowledged limitations to measure in broad degree the extent of carious lesions. It is doubtful whether a scale with a larger number of divisions would be of practical value or capable of a more exact interpretation.

Accepting such findings, it must be concluded that degree indices are of no value in static surveys, in that they give no further information than the D.M.F. which is basically more accurate.

The information of greatest importance in experimental surveys is whether a given environment reduces or increases the rate of caries incidence.

The other information which has been sought (often ineffectually by the incorrect use of degree indices) is whether the given environment reduces or increases the rate of progression of a caries lesion, or whether caries is completely arrested.

It has been shown that incidence susceptibility is not obviously related to the extent of carious lesions, and that once a lesion has commenced, its progression is mainly a matter of time in the majority of cases. Thus an environment which reduces caries incidence does not necessarily reduce the rate of caries progression.

In closely controlled experimental work neither the Bodecker nor the Mellanby scales would appear to be sufficiently sensitive for reliable interpretations. Even if it were possible to assess cavity size to a high degree of accuracy a true assessment of caries progression could only be obtained if conservative treatment was withheld and extractions postponed for a long period of time. This is neither desirable nor possible.

It would appear therefore that the assessment of resistance to caries already present (and that is the main object of a degree index) can only satisfactorily be obtained from the incidence of arrested caries or preferably from histological evidence.

Conclusion

Much unnecessary complication has been introduced into dental statistics claiming to measure caries susceptibility. The many methods which have been used in attempts to measure caries susceptibility have been the source of much confusion to the student wishing to assess all the presented clinical data concerning dental caries.

In an attempt to analyse and simplify, if possible, the measurements of susceptibility, it

has been determined that conclusions based on some of the indices used cannot be accepted because the scales providing the basic data have been illogically conceived.

It has been determined that the measurement of caries incidence is by far the most important and reliable indication of caries susceptibility.

The D.M.F. index for permanent teeth and d.m.f. index for deciduous teeth when used as described, provide the universal index of caries incidence.

The former is applicable to all types of investigations except Type IV when it is suggested the D.F. index be used.

The progression of a carious lesion has been shown to be mainly a matter of time and not obviously related to caries incidence. This being so, degree indices are of doubtful value in static surveys.

In experimental surveys, degree indices are of insufficient sensitivity to be of a practical value and can be dispensed with.

Apart from the incidence of dental caries the only information of practical value is the incidence of arrested caries, information which is difficult to obtain satisfactorily, but nevertheless of great importance.

ACKNOWLEDGMENT

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BIBLIOGRAPHY

ARNOLD, F. A., Jr. (1943) *J. Amer. dent. Ass.*, **30**, 499.
——, DEAN, H. T., and SINGLETON, D. E., Jr. (1944) *J. dent. Res.*, **23**, 155.
BODECKER, C. F., and BODECKER, H. C. W. (1931) *Dent. Cosmos.*, **73**, 707.
—— (1939) *J. Amer. dent. Ass.*, **26**, 1453.
DAY, C. D. M., and SEDWICK, H. J. (1935) *Dent. Cosmos.*, **77**, 442.
—— (1944) *Brit. dent. J.*, **76**, 143.
GILDA, J. E., and GOLDBERG, H. J. V. (1948) *J. dent. Res.*, **27**, 161.
JACKSON, D. (1948) *Brit. dent. J.*, **85**, 79.
KING, J. D. (1944) *Dent. Rec.*, **64**, 103.
—— (1938) *Lancet*, **2**, 109.
KLEIN, H., PALMER, C. F., and KNUTSON, J. W. (1938) *Pub. Hlth. Rep.*, **53**, 791.
——, and KNUTSON, J. W. (1942) *J. Amer. dent. Ass.*, **29**, 1420.
KNOWLES, E. M. (1948) *Brit. dent. J.*, **84**, 119.
McBEATH, E. C., and ZUCKER (1938) *J. Nut.*, **15**, 547.
——, and VERLIN, W. A. (1942) *J. Amer. dent. Ass.*, **29**, 1393.
MELLANBY, M., and MELLANBY, H. (1948) *Brit. med. J.*, **2**, 409.
SANDLER, H. C. (1940) *J. dent. Res.*, **19**, 545.
SHEPHERD, P. R. (1945) *Brit. dent. J.*, **78**, 73.
STONES, H. H., *et al.* (1949) *Brit. dent. J.*, **86**, 264.
WEAVER, R. (1944) *Brit. dent. J.*, **76**, 29.
WHYTE, R. (1943) *Brit. dent. J.*, **75**, 247.

THE DENTAL NURSE IN THE FEDERATION OF MALAYA

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Chief Dental Officer

IN common with most countries of the world the Federation of Malaya is faced with the problem of treating the teeth of the school children. The peninsula which comprises this territory stretches between the Siamese border in the north and the Straits of Johore in the south. The population at the end of 1948 was 5,003,728. Roughly speaking 2,000,000 are Malays, 2,000,000 Chinese and the remainder Indians, Eurasians and others.

The Federation has a dental service which has expanded considerably in the last decade. There are thirty dental officers working in the clinics scattered over the peninsula. The clinics are sited in all the main centres from Johore Bharu to Penang. It will be noted that Singapore is excluded from this article because it is not part of the Federation of Malaya and has a separate dental service of its own.

Priority is given to the treatment of school children and it works out that about 75 per cent of the working time of the dental officer is devoted to this end. The remaining 25 per cent is spent in treating hospital cases, ante-natal cases, members of the police force and the very poor.

The problem which has to be faced is how to treat 600,000 school children with 75 per cent of 30 dental officers.

The idea of the dental nurse dawned slowly, but the more the scheme was considered the more attractive did it become.

It was argued that 300 dental officers necessary to make any impression on the schools was outside the economic possibility of Malaya. It was held that if each of the present 30 serving officers was given five nurses trained to do routine work of a simple nature, it would enhance the value to the public of the dental officer by making him a team leader, and enable him to devote his time and technical knowledge to tasks which can only be done by a highly trained dentist. Given a team to whom he could relegate simple operative procedures he could turn his talents to orthodontics, to working with the surgeon on maxillo-facial cases, to splint work and the 101 jobs which should be undertaken if there is time to do them.

The nurse on the medical side takes a great deal of responsible work from the physician or surgeon; the health officer relegates much work to the health inspector, but the dentist in Govern-

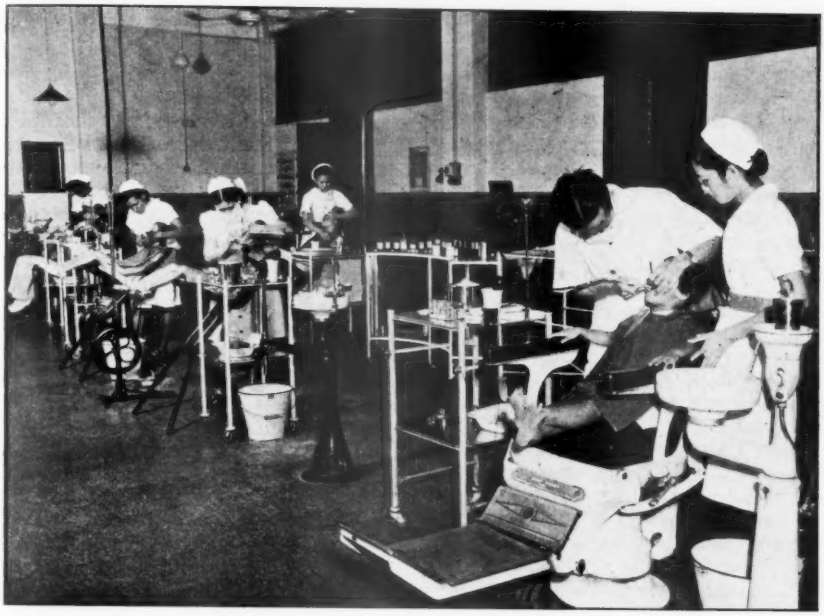

FIG. 1.—The first class in training at the Dental Department, General Hospital, Penang.
[Photograph by courtesy of Dept. of Public Relations, Federation of Malaya.

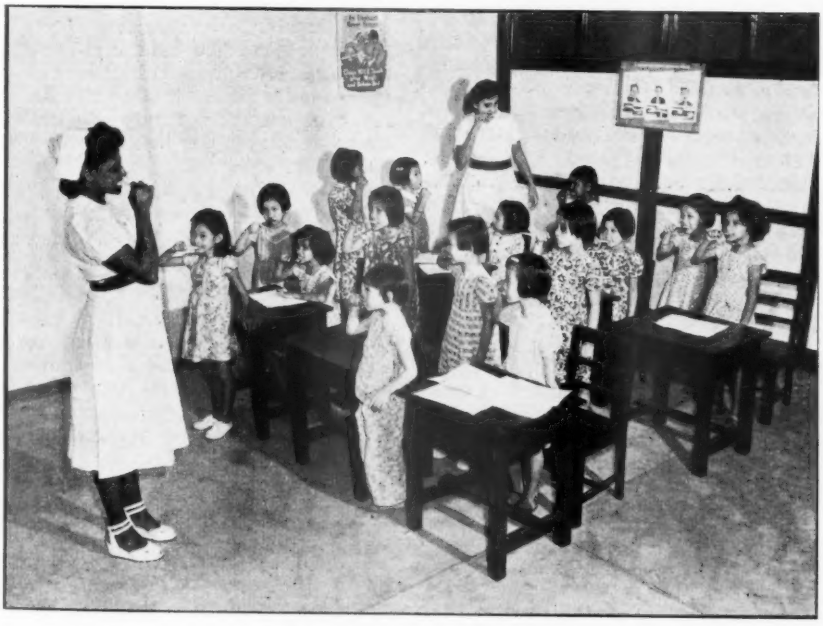

FIG. 2.—A lesson in oral hygiene.
[Photograph by courtesy of Dept. of Public Relations, Federation of Malaya.

ment service has no such relief from routine detail. It was decided that the training and employment of suitably trained nurses as dental nurses was well worthy of a trial.

A scheme was drawn up and an experimental team of five girls went into training in July 1949 at the Dental Department, General Hospital, Penang. These girls were drawn from Kedah, Malacca, Penang, Selangor and Perak. Three were Chinese, one Malay and one Sinhalese. They were all fully trained in general nursing.

It may be mentioned in passing that it has been found that there is no racial aptitude or other difference. All nurses displayed enthusiasm, skill and ability.

The scheme takes nurses who have finished their three years' general medical nursing and gives them a one-year course at the Penang School, in simple dental operations and then puts them back to their States where they work under the close supervision of the local dental officer for another year, after which time they are ready for school clinic work.

The teaching staff at the Dental Nurses School consists of two dental officers (L.D.S.Singapore) and one sister Tutor Dental who was trained in New Zealand. All are under the direct supervision of the Chief Dental Officer.

On the theoretical side only the special dental subjects are taught, as trainees have already passed their Anatomy, Physiology, etc., in the general medical training.

A course in macroscopic and microscopic anatomy of the teeth familiarises the nurse with the field in which she will work.

Dental Pathology and Dental Surgery lectures are given two afternoons per week for the first year and the standard set is slightly below that of the L.D.S. Dental Drugs and Materials, the Theory of Cavity Preparation and the Care and Maintenance of Equipment completes the list of lectures. The trainees also prepare and deliver lectures suitable for children in Oral Hygiene.

The practical instruction commences with the carving of plaster blanks into teeth. This enables the nurse to bring out the anatomical landmarks learnt in the Dental Anatomy course and accustoms the fingers to the use of instruments. Next the "phantom head" or "dummy" is introduced and every step in cavity preparation is carefully taught.

The field of operation is limited to teeth posterior to the canines, in both the temporary and the permanent dentition, as it is in these teeth that most caries is seen in Malaya and it is not considered expedient to increase the commitment of the dental nurse beyond the use of amalgam. The scope of the nurse is further limited in that her activities are devoted to children only, within the scope of a properly supervised public dental service for school children. After proficiency is reached on the "dummy," the trainee is taught to handle patients.

Her initial task is recognising and charting the various common dental pathological conditions. Next she is taught to scale and clean and after a period prepares and fills carious cavities.

Having been accustomed to the use of the hypodermic syringe during her medical training and ward work, the dental syringe is easily mastered.

Extractions, as with the dental students, are a matter of a small dose of theory and a large measure of practice.

Throughout the training every step in technique is checked and it is reiterated time and time again that any and all difficulties or complications must be referred to the dental officer. All exposures of the pulp whether caused by caries or the bur are handed over to the same guiding authority.

The original five trainees have now completed their training in the school and are being transferred back to the dental clinics in their own States.

Twenty new trainees have commenced work.

The writer has every confidence that valuable treatment, which otherwise would not be done, will now be started and a beginning has been made to stem the rising tide of caries which in Malaya seems to rise in proportion to the sophistication of the population and their adoption of urban habits.

THE USE OF IRREVERSIBLE HYDROCOLLOIDS IN CONSERVATIVE DENTISTRY

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An earlier article [*B.D.J.* (1950), **88**, 240] discussed the great value in conservative dentistry of the reversible or agar hydrocolloid impression materials which are extensively used in America but, unfortunately, are not yet generally available to dental surgeons in this country It also described a technique which the present writer had found to give excellent results. This article describes a technique for using the irreversible hydrocolloids or alginates which are obtainable here and which will give comparable results if the dental surgeon bears in mind that they must be manipulated differently from the reversible hydrocolloids because their physical and chemical properties are not the same.

A hydrocolloid is by definition a colloid with water as the dispersion medium.

> "The colloid may be a gel with a structure which allows the water to be held in the gel by capillary action. If the gel can be changed to a colloidal sol by some physical means, e.g. by heating, and if the gel is again formed upon cooling, the hydrocolloid or gel is said to be reversible. On the other hand, if the colloidal sol is changed to a gel by a chemical reaction for example, and if the gel cannot be returned to the sol condition by simple means, the hydrocolloid is said to be irreversible."

The irreversible hydrocolloids are generally some form of soluble alginate. Either potassium or sodium alginate can be used and, as Skinner (1950) emphasises, the essential difference between the agar and alginate hydrocolloids is the method by which the gel is formed in the patient's mouth. The process of gelation in the case of the agar mixtures is a liquefying one at a temperature near to the boiling point of water and the changing of the sol to a gel at a temperature about that of the mouth. In the case of the alginates a reaction occurs between the sodium or potassium alginate and calcium sulphate to form an insoluble gel.

Skinner (1950) has recently made extensive laboratory investigations into the two types of hydrocolloids and his conclusion "that once the gel has been formed the essential properties of the two materials are very similar" confirms the clinical observations of the present writer who has found the alginates to be quite as effective as the agar hydrocolloids and a little easier to manipulate. It should again be emphasised that the hydrocolloids make it possible for the dental surgeon to make multiple inlays, crowns and bridges with the minimum effort and to reduce the strain on the patient by transferring to the laboratory much of the work usually done at the chairside.

After the impression has been taken the same technique can be used for both (*see* previous article).

The irreversible hydrocolloid available in this country is Zelex and the technique described below can be followed with this material. Its physical properties are well known ; it is easy to mix, it has a rubber-like consistency, it is resilient and tough and can be inserted at a temperature which cannot damage or irritate the tissues of the mouth.

Before taking the impression it is essential that all the margins of the cavity should be free from gingival tissue because the impression medium is too soft to push tissue away. If it cannot be pushed away beforehand the hydrocolloids should not be used. A list of the methods by which the margins of the cavity can be left clear was included in a previous article, but the following highly satisfactory method might again be mentioned.

A piece of thin string soaked in 1 in a 100 adrenalin solution or in an 8 per cent zinc chloride solution can be adapted around the cervical part of the tooth and the gum tissue pushed away by applying a blunt plastic instrument to the string. The impregnating solutions serve both to arrest hæmorrhage and to shrink the tissues away from the cervical margin of the cavity. Where there is excessive tissue growing over the cervical margin it can be removed by electrocautery. This method has been found to be most suitable for Class II cavities.

Instruments Required and the Technique of Mixing

The special intruments needed are few and are as follows :

(1) A 5 c.c. Record syringe with 18, 20 and 22 gauge needles. (The gauge depends on the size of the grooves or retention pinholes in the preparation and the spaces between the teeth.)
(2) A Fahrenheit thermometer.
(3) A perforated crown tray.

(4) A large plaster bowl.
(5) A spatula.
(6) A Zelex balance.

The temperature at which the alginates are used is approximately 70° F. and there is thus no thermal shock to the patient. If during the summer the room temperature is higher the setting time can be prolonged by cooling the liquid with ice. Two minutes extra working time are gained in this way. The chemical processes which take place when the powder and liquid are mixed require that the mixer and rubber bowl should be entirely free from contaminating chemicals such as plaster of Paris, dental stone, or investment. The correct proportions of liquid and powder are obtained by using the balance supplied by the manufacturers. As with the reversible hydrocolloids a perforated tray is used, but no water cooling device is needed. Jordon (1945) prefers a tray which is not perforated, on the grounds that perforations do not enable the tray to force the impression medium into intimate contact with the teeth and soft tissues. The writer, however, has found a perforated tray perfectly satisfactory and believes that the firm hold it has on the impression when it is being removed helps to prevent displacement and the risk of warping.

Taking the Impression

Class II Cavities.—All debris is first removed from the cavity and adjacent teeth and the area isolated with cotton-wool rolls. The teeth are carefully dried with warm compressed air, and care is taken to avoid hæmorrhage which would spoil the impression. The correct proportions of liquid and powder are measured on the balance and spatulated for one-and-a-half minutes to produce a smooth cream. Insufficient spatulation leads to a weak impression. Some of the mixture is inserted into the syringe with a cement spatula and the rest placed on the tray. With the help of the syringe the alginate is first injected into the less accessible and deepest parts of the cavity so that it is filled from the bottom and air is displaced as the mixture rises. This process is continued until all the teeth concerned are covered. The tray is then seated in its correct position, care being taken not to contaminate the Zelex already in the cavities with saliva, and is held rigidly until gelation is complete. Skinner (1950) stresses the need to leave the tray in the mouth until the strength of the alginate is at its maximum, which is reached three minutes after gelation. Hence at least five minutes should elapse between the time mixing is begun and the removal of the impression. Skinner (1950) also emphasises that—

> "regardless of the type of hydrocolloid the impression must be removed from the teeth and tissues suddenly. It is characteristic of a gel that it can resist a sudden deformation without fracture much better that it can a slowly applied static force."

Class V Cavities.—Although the indirect method is rarely needed for Class V gold inlays it must be employed when porcelain is chosen as the restorative material. It is the writer's experience that better-fitting porcelain inlays are obtained when hydrocolloids are the impression materials used. For these inlays the alginate is carried to the mouth not on an impression tray but on a piece of wax (1 in. × ½ in.) to which a sheet of linen gauze of slightly greater length but of equal width is attached (fig. 1). As

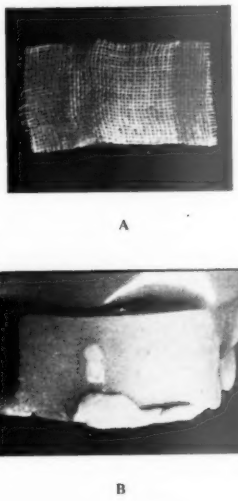

FIG. 1.—A, wax with muslin; B, impression in place; C, model.

illustrated in fig. 1 the gauze is sealed to the wax only at the ends, and the middle part is left free. After the Zelex has been mixed the syringe is filled and its contents injected between the gauze and the wax (fig. 2). Some of the paste

FIG. 2.—Injecting Zelex between wax and linen.

penetrates the linen and more is added to the surface before the wax is inserted in the mouth. As with Class II cavities the teeth are dried and the alginates injected into the cavity. Then the paste attached to the wax and gauze is pressed against the teeth and left for at least three minutes before being removed (fig. 1B).

To obtain the best results the impression should be poured in stone immediately after removal from the mouth. If it is inconvenient to do this the impression must be wrapped in a wet towel. In no circumstances should the alginate be kept for more than a few hours before being cast.

CASTING THE IMPRESSION

Before casting the impression it must be rinsed in cold water to remove free mucus and then immersed in an alum-fixing solution. The manufacturers of Zelex advise that the impression should be moved about for from thirty seconds to a minute so that all the surfaces come in contact with the solution. After excess alum has been washed off the impression is ready to be poured. These precautions ensure a clean sharp model irrespective of the plaster or stone material used.

The stone usually employed is Q.S. Stonehard, which has given uniformly good results. It sets within thirty minutes after which time the impression is separated from the model and then slowly dried. Before being used the model is soaked in a light liquid paraffin or glycerine and then dried with blotting paper. The method of sectioning the model (fig. 3) and articulating

FIG. 3.—Sectioned model articulated with plastic key.

with a plaster key described in the earlier article is very satisfactory, but some may prefer to use a model holding individual dies which can be removed and held in the hand. To obtain this the teeth containing the cavities (fig. 4) are poured first by vibrating small quantities of a thick mix of stone into them. A cone of stone mix is then rolled in the fingers and placed over each of the tooth impressions already filled to provide a root portion of the die. If the teeth are large a used short bur is inserted into the root portion to act as a dowel pin (fig. 4). An exception to this procedure occurs when thin sections of hydrocolloid form the mesial and distal portion of the impression of the individual tooth. In this instance the teeth on either side of the cavity preparations are also poured to prevent the distortion which would be caused by the pressure of the stone against the thin sections of the impression material. The partially poured impression is then left in a humidor or covered with a moist napkin until the stone has set. For this at least half an hour should be allowed.

TRIMMING INDIVIDUAL DIES

The impression is taken from the humidor or napkin and the dies removed with a straight pull. Excess root portion of the dies is removed with round stones and discs and the cervical part of the preparation is carefully trimmed. If a dowel pin has not yet been inserted (as is usual when teeth are small) the end of the root is ground flat and a small hole is made for a bur which is fixed in position with zinc phosphate cement. If possible all pins should be parallel with each other and with the long axis of the teeth to facilitate the work to be done in the laboratory. In this technique multiple dies can be obtained by casting one whole section of the model containing the preparations, removing it and cutting it up and trimming it into separate dies. When the dies have been shaped so that

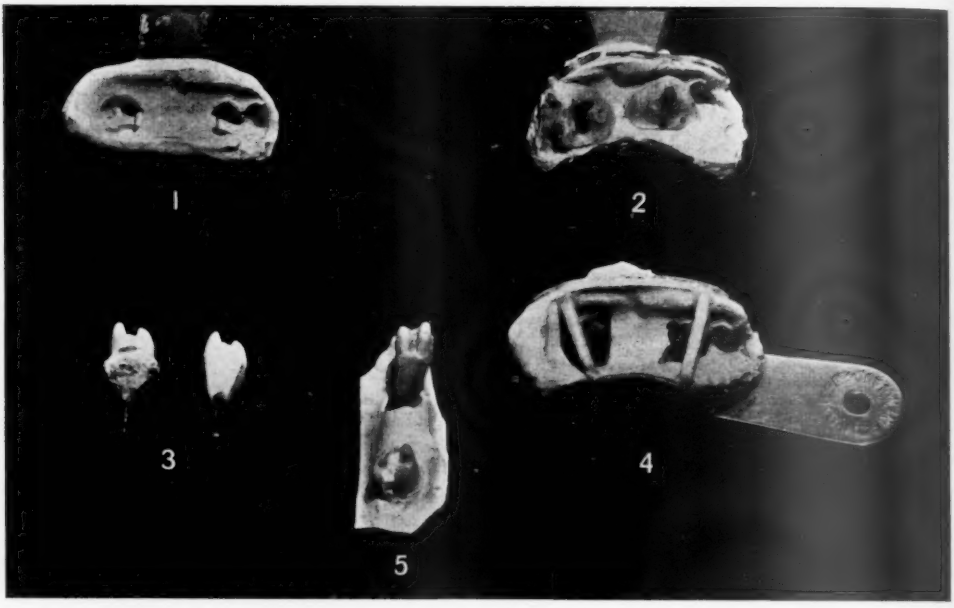

FIG. 4.—Steps in the preparation of model with removable dies. (1) Impression in alginate. (2) Impression with abutment teeth poured in Stonehard. (3) Die before and after trimming. (4) Impression with trimmed dies sealed and fixed with matchstick. (5) Model with 1 die raised and 1 in situ.

the root portion tapers towards the apex a thin smear of vaseline is applied to each of them. They are next reseated in their respective positions in the impression and held by placing matchsticks beside the dowel pin or root portion (fig. 4) and cementing the sticks to the side of the impression or wax box with sticky wax. Stone is now poured into the impression and over the dies, but not over the ends of the dowel pins. Within half an hour the dies can be removed from the model by tapping lightly against the ends of the dowel pins. After the model has been neatly trimmed and the ends of the pins covered with carding wax the model is placed on an articulator against a model obtained from an impression of the opposing teeth.

A variation of the above procedures is to take two impressions and to use one for obtaining a master model and the other for obtaining individual dies for the purpose of carving wax patterns. These can be placed on the master model to check occlusal and interproximal relations.

CARVING OF WAX PATTERNS AND INVESTING

The next step is to carve the wax patterns. The special precautions needed at this stage were fully explained in a previous article. The casting procedures are exactly the same as those used in any other method of inlay and bridge constructions.

FOUR TYPICAL CASES

The burden of these articles has been that hydrocolloid impression materials are admirably suited to the construction of multiple inlays, crowns and bridges. The following cases will illustrate the scope

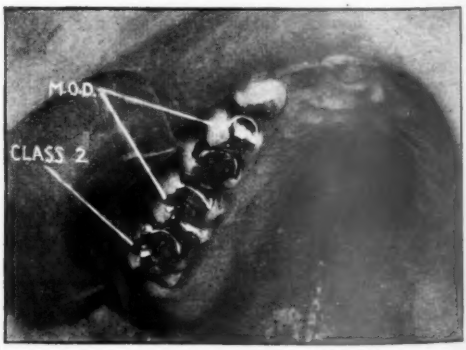

FIG. 5.—*Case* I.

of alginates and will show that complicated procedures can be carried out after taking, in many cases, only one impression.

Case I (fig. 5).—Three large cavities had been cut which where an M.O.D. in $\overline{4}|$, and M.O.D. $\overline{6}|$ and an occlusal mesial cavity in $\overline{7}|$. These inlays were all completed on one model obtained from a single impression. The restorations together with two in the lower jaw were fitted the day after the impressions had been taken.

Case II (fig. 6).—A semi-fixed bridge replacing a lost $\overline{5}|$ was completed on a model obtained from a single impression. An advantage of the method for this kind of restoration is that the operator has his model with the correct relation of the abutment teeth from the beginning and a surveying device can be used to denote the best path of insertion of the finished bridge.

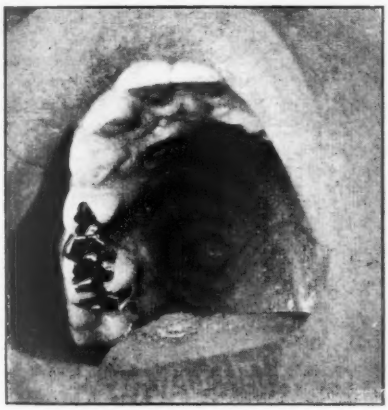

FIG. 6.—*Case* II.

Case III (Fig. 7).—A bridge restoring $|\overline{2}$ was made by preparing a three-quarter crown on $|\overline{3}$ and having a rest in a groove in a distal inlay in $|\overline{1}$. This restoration with its groove preparations was quickly completed from one impression.

Case IV (Figs. 8 and 9).—Two fractured teeth $\overline{1}|\overline{1}$ were restored through a hydrocolloid impression medium and using two three-quarter crown preparations with silicate facings.

FIG. 7.—*Case* III.

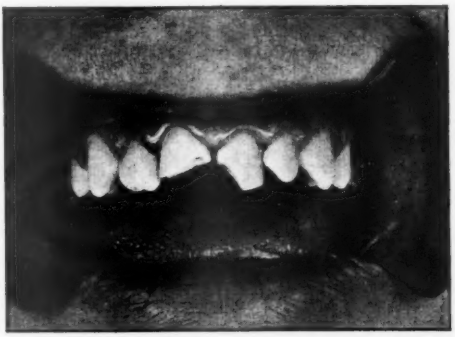

FIG. 8.—*Case* IV.

FIG. 9.—*Case* IV.

The last two cases illustrate clearly the suitability of the impression material for registering the grooves used in three-quarter crown preparations.

Only a few cases have been quoted to illustrate some of the occasions when hydrocolloids can be used to advantage. Many other types of restoration such as pin-ledge preparations can be satisfactorily undertaken with the method and those who take the trouble to master the technique will find that procedures which in the past were considered difficult and tedious will be simplified and will become almost commonplace.

The writer wishes to thank Mr. L. Stones and Mr. J. A. Gordon for their valuable assistance in preparing the illustrations, and the staff of the Photographic Department of the United Sheffield Hospitals for their kind co-operation.

REFERENCES

JORDON, L. G. (1945) *J. Amer. dent. Ass.*, **32**, 985.
SKINNER, E. W. (1950) *J. Amer. dent. Ass.*, **40**, 196.

BRITISH DENTAL JOURNAL

OCTOBER 3, 1950

THE VALUE OF MEETINGS

THE accounts which have appeared in the Journal of the proceedings at the recent Annual Meeting of the Association, together with the publication of the papers read at the meeting and the discussions which arose on them, will give members who were not present at Birmingham some idea of what took place at the meeting. Taken by themselves, however, they must inevitably fail to convey the full flavour of the meeting to the absent member who has not already had sufficiently long experience of such meetings to enable him to read between the lines. The bare announcement that the President and members of the Central Counties Branch gave a Reception in the Great Hall of the University can, for instance, hardly help him to conjure up a picture of the animated scene at that highly successful function, as members from different parts of the country greeted their old friends whom they had not seen since the last Annual Meeting of the Association. Between, and during, the dances which enlivened the proceedings, small knots of men could be seen deep in conversation, and it was a fair guess that sooner or later, most probably the former, the talk would have turned to matters of dental practice or dental politics or, in many cases, both. Thus, to the refreshment of the spirit, which the renewal of friendships always brings, was added a broadening of outlook as the result of the interplay of mind upon mind.

It is, indeed, arguable that to bring together members from all over the country, and so to provide them with opportunities for informal discussion on all manner of topics, is not the least important of the functions of an Annual Meeting. Some members who have not hitherto attended an Annual Meeting may fondly imagine that, by reading the papers and the discussions in the Journal, they can learn as much as they could by attending the meeting. This is a wholly mistaken view. Restrictions of time place a limit on the number of speakers who can take part in the discussion of any one paper, and considerations of space make anything more than a condensed report of the speeches impossible. Moreover, in nearly every case, the formal discussion of a paper is supplemented by an informal one amongst those who are specially interested in the subject under debate. Mr. Leatherman's paper on Oral Hygiene, for instance, provided the subject matter for an animated discussion in an adjoining room for some considerable time after the main discussion had been closed. Demonstrations lend themselves more readily to free and easy question and answer than do papers, but it is obviously impossible to obtain written reports of these, so that only those who are present at the meeting are in a position to profit from what is one of the most valuable features of an Annual Meeting. How much the opportunities for informal discussions of this kind are appreciated can be gauged by the fact, previously recorded in the Journal, that Dr. Lindblom, after reading his paper on Bite Analysis and giving demonstrations on the subject on two afternoons, was still surrounded by an interested crowd long after the time set for the conclusion of the meeting. That those who availed themselves of the chance of discussing the various points raised by Dr. Lindblom directly with him learned much more than they could have done merely by reading his paper is quite certain, valuable though the printed page is as a permanent record.

It is a curious and regrettable fact that the percentage of members who attend meetings of the professional organisations has always been much lower in this country, where distances are relatively short, than it is in the Dominions and the United States of America. It is difficult to find a satisfactory explanation of this apparent indifference of the great majority of members of the profession to the opportunities which such meetings afford them of increasing their knowledge and obtaining a better understanding of the problems, scientific, technical and political, with which the profession is concerned. It might have been thought that practitioners of a calling which, by its very nature, tends to isolate the individual in his own surgery, would have felt a special urge to cultivate the acquaintance of their fellow practitioners, and so to widen their outlook and possibly improve the standard of the service they render to their patients. Now that the country is gradually being covered by a

network of sections within the branches of the Association, there will be less excuse than there was before for any practitioner to continue to deny himself the advantages which flow from associating with his colleagues, and experience proves that once the habit of attending professional gatherings has been acquired, it is not lightly broken. The very smallness of the areas of sections affords them great opportunities of inculcating this desirable habit in their members, and so in turn of increasing the attendance at the Annual Meetings of the Association and those of the branches.

It is particularly to be hoped that there will be a greatly increased attendance at the Annual Meeting in London in 1951, to provide a worthy celebration of the Jubilee of the Metropolitan Branch, and to do honour to the President-Elect who has given so much devoted service to the profession and the Association.

Nor must it be forgotten that in 1952 we, in Great Britain, are to have the privilege of entertaining our colleagues from all parts of the world at the International Dental Congress in London. This event will present members of the profession with an opportunity of listening to, and learning from, the foremost figures in the various branches of dental science, both in the formal discussions that will take place and in the many informal talks which are an essential feature of all such congresses.

NOTES AND COMMENTS

Medical Protection Society

THE Annual Report of the Medical Protection Society for 1949, as usual, is full of interest. Problems arising out of the operation of the National Health Service have added greatly to the work of the Society. This is not surprising for, as the Solicitors observe in their report, " Never before has a body of professional men been subject to such a volume of legislation, rules and regulations as that with which doctors and dentists must now contend, and as a result there are many pitfalls." The existence of these pitfalls has had the salutary effect of making members of the professions more alive to the necessity of protecting their professional reputation, with the result that a record number of new members, 1,940, were elected to the Society during the year under review. The importance of seeking the advice of the Society immediately any difficulty arises is again emphasised, and it is easy to appreciate that a Society which gave advice to over seven per cent of the members during the year is able to handle complaints of any kind more effectively than any individual practitioner could hope to do. An important section of the Report deals with the legal liabilities of members of hospital staffs and salaried officers. This makes it abundantly clear that doctors and dentists in these categories are liable to be sued for alleged negligence in precisely the same way as a private practitioner, and that if the hospital or other authority is sued for such negligence they would be entitled to throw the liability on to the professional man concerned. Commenting on a case in which the question arose whether a patient had or had not been accepted by a dentist under the National Health Service, the Report suggests that it is essential that dentists should " make it perfectly clear to a patient when accepting him or her for private treatment that fees will be charged and that the contract has nothing to do with the National Health Service Scheme." It is further suggested that a note to this effect should be made at the time on the patient's record card together with the name of any witness who was present when the arrangement was made. The Balance Sheet shows that the financial position of the Society is so strong that in spite of rising costs it has not yet become necessary to increase the annual subscription from its present modest figure of £1.

Dental Nurses in America

THE Massachusetts legislature have repealed the Act under which a number of women were being trained at the Forsyth Dental Institute to fill teeth under the supervision of a registered dentist and it is understood that this experimental " special programme of dental research " is being discontinued forthwith. This result has been achieved through the action of the professional organisations, both the American Dental Association and the Massachusetts Dental Society having opposed the scheme.

Cost of Dental Treatment in America

DETAILS of a dental insurance plan, given in the *News Letter* of the American Dental Association, throw an interesting side light on the cost of complete dental treatment in New York. The plan has been devised primarily to meet the cost of adequate dental care for families with an income of less than $5,000, approximately £1,785 at the present rate of exchange. Patients are to have free choice of any dentist who participates in the plan. The scheme is based on groups of employed persons—it being a requirement that at least 75 per cent of the group enrol in the scheme. A subscriber to the plan is required to pay up to $150 (£53), on a moderate

scale of fees, for any initial treatment he requires and thereafter will be entitled to free maintenance treatment. The premium for this service is expected to be $19.80 for a single person and $72 for a family of three or more (approximately £7 and £30 respectively). The scheme is being launched on an experimental basis for a period of two years and is to be limited to 25,000 subscribers.

Early Nineteenth Century Fees

MR. J. MENZIES CAMPBELL sends us the following extract from a Table of Fees adopted, in January 1829, by the medical practitioners in Aberdeen : Visits in Town. Lesser Operations : Introducing bougie, catheter, probang: vaccination: extracting teeth : cupping : applying leeches, Higher Class £1 1s. ; Middle Class 10s. 6d. ; Third Class 5s. It is of interest to note that the idea of an itemised scale of fees is not quite so modern as is generally supposed to be the case, although apparently the fee charged for extracting teeth was per visit and not per tooth. The fact that these fees included domiciliary visits must be borne in mind in making comparisons with present-day fees based on the changes which have taken place in the value of money.

Fifty Years Ago

From the "Journal of the British Dental Association," October 15, 1900.

Appendix No. 19 of the Regulations for Army Medical Service, 1897, issued February 1, 1899, gives the following instruments for use in all station hospitals : Contents of Case of Tooth-Stopping Instruments : Hand Burs, 2 ; Double-ended excavators, 2 ; Double-ended plastic filler (Ladmore's), nickel plated, 1 ; Ditto (Wallis's), 1 ; Ditto, and amalgam spoon, nickel plated, 1 ; Double-ended probe, nickel plated, 1 ; Scaler, nickel plated, 1 ; Stump file, 1 ; Dressing forceps and probe, nickel plated, 1 pair ; Mouth mirror, nickel-plated metal handle, 1 ; Copper amalgam, 1 oz. ; Mortar and pestle, 1 ; Stick of gutta-percha, 1 ; Leather-covered case to contain above, 1. I think most dentists will agree that such a list is ridiculously inadequate for any useful purpose, but the most significant point of interest centres in a footnote, which states that instruction as to the use of these instruments will be found in the pocket of the case.

From a paper "The Need of Dentistry, by the War Office" by Sir (then Mr.) Norman Bennett who remarked "The idea that knowledge of the practical use of stopping instrument can be conveyed by written instructions is surely too ludicrous to be seriously considered."

LETTERS TO THE EDITOR

MANDIBULAR OSTEOTOMY

SIR,—On rather limited experience, personal and observed, I rather agree with the criticisms of the mandibular osteotomy in cleft palate cases as noted in your correspondence of August 4. It would be interesting to have a report from those cleft palate clinics that are constantly doing this operation, e.g. Stockholm.

For my own part I greatly deprecate that we plastic surgeons have not as yet demonstrated the value of complete maxillary restoration. The maxilla is underdeveloped in all cases of cleft palate whether operated or not. The malar prominences and maxillary cheek prominences are invariably flat as compared with the normal, and the nose is projected from the head at an angle far less acute than on a normal facies. By bringing the mandible back to the underdeveloped maxilla a new type of facies is perpetuated and a gullible form of improvement handed to the patient.

Many of us are hoping that the era of maxillary restoration has come and that when it is established the upper dentures will be fully functional without interference with the mandibular arch. I agree that it is the fault of the plastic surgeon that he has not as yet produced the goods, but it is up to our dental colleagues to reconsider the matter and to persist in the attempt for normal restoration of the maxilla until it becomes the accepted practice.

149, *Harley Street*, *London, W.*1. Yours faithfully, H. D. GILLIES.

NOMENCLATURE OF DRUGS

SIR,—A correspondent suggests that Xylocaine and Xylotox are identical. Available evidence does not support this view. The published formula of the original preparation, Xylocaine, is as follows :

w-Diethylamino-2-6- etc. ..	2·0 gm.
Sodii chlorid	0·6 gm.
Sodii pyrosulphis	0·05 gm.
Methyl paraoxybenzoes ..	0·1 gm.
Aqua sterilisata	

A similar solution with the addition of epinephrine is also supplied.

The makers of Xylotox declare the following formula :

w-Diethylamino-2-6- etc. ..	0·02 gm. per c.c.
Epinephrine	0·0000125 gm. per c.c.
Caprylhydrocupreinotoxin hydrochloride	0·00002 gm. per c.c.
Thymol in Ringers' solution	0·0004 gm. per c.c.

The formula of the original Xylocaine would indicate a bland, isotonic solution having a pH value close to the neutral pH 7. On the other hand, the presence of the quinine derivative, capryl, in Xylotox would suggest a somewhat acid solution probably around pH 4.

It is probably the case that the quinine derivative in Xylotox is used as both a preservative and germicide. The view expressed by Doubleday *et al.* on the subject of quinines incorporated in local anæsthetics will not be unknown to your readers.

Of much importance too is the considerable volume of experimental, research, clinical and other evidence already published in several countries in support of the original preparation, Xylocaine.

c/o Glyn Mills & Co., *Whitehall, S.W.*1. Yours faithfully, J. S. SMITH.

XYLOCAINE

SIR,—I have been using local anæsthetics for conservative dentistry for 20 years ; there have always been difficulties with certain nervous patients and with particular teeth (notably cervical cavities in upper incisors

for instance). One has hoped in vain for the ideal drug : I believe that the " almost ideal " has appeared in the form of Xylocaine (and Xylotox). I have been using this anæsthetic on a hundred or so difficult cases and I am amazed with the results : several were patients upon whom procaine had previously had little or no effect. It is extremely rapid in action, the anæsthesia is profound and so far there have been no signs of " side effects " ; operations carried out with great ease included, pulp extirpation during acute pulpitis, cervical cavity preparation and surgical extractions—all with the submucous infiltration of a few minims.

These preliminary successes suggest that the days of intra-osseous and other complicated methods are over, and I really feel that the advent of Xylocaine is the greatest contribution to painless dentistry since the discovery of procaine.

35, *Brundholme Terrace*, *Keswick*. Yours faithfully, LESLIE SPAREY.

HYDROCOLLOID IMPRESSION TECHNIQUE

SIR,—I have read with interest E. C. Hampson's published article on the " Hydrocolloid Impression Technique " and Mr. J. Gordon's letter on the same.

Equally good results are obtained by using as a wash " Three in One Cream " made by the Dental Perfection Co., California, U.S.A. This is a powder and cream which mixed in the correct proportions after spatulation for 1½ minutes, is inserted into a tray holding the snap impression in compound of the bridge abutments. The impressions of the abutment teeth in compound are enlarged and undercuts made to hold the cream. Before taking the final impression the abutments are dried and the cream forced into the cavities with a small brush or plastic instrument. The impression is allowed to harden in the mouth for 3 minutes and then taken out with a quick jerk. Due to the elasticity it will not break. The models are cast immediately in " Diolite " or stone plaster and the bridge prepared from this very accurate model. If plastic " Pre-Carv " bridge retainers are used (which are available in different types for anterior and posterior teeth) for the dummies, the whole bridge can be assembled and cast in a few hours.

This method saves the time involved in preparing hydrocolloid and considerable expense as no extra equipment is required, such as special syringes and thermostatically controlled heaters to keep the hydrocolloid at even temperatures.

I have been using this " Three In One Cream " since 1947 and have made over 500 bridges with different abutments such as full crowns, ¾ crowns, pin inlays, split inlays, M.O.D.s, etc., with astonishingly excellent results.

13, *Curzon Road*, *New Delhi, India*. Yours faithfully, N. N. BERY.

DIFFUSION OF PENICILLIN

SIR,—With reference to Mr. Shuttleworth's paper on the diffusion of penicillin, it would be interesting to know the ages of the teeth used in his experiments ; also, if he has found any differences in the rate of permeability of cementum of teeth of young and old patients.

38, *Falkner Square*, *Liverpool*, 8. Yours faithfully, E. R. W. CLARK.

EARLIER ERUPTION OF THE TEETH

SIR,—I am indebted to the several correspondents on this subject although it would appear that at present we have no real evidence to offer the health visitors or their Australian friends in support of their contention that the children of Britain do cut their teeth earlier today than they did twenty years ago and that the children of Britain are more precocious than their Australian brothers and sisters.

Numerous instances have been given of early eruption and there are undoubtedly many cases of late eruption. My parents used to delight in stating that I had no teeth at all until twelve months old when, hey presto, I cut the lot. Although sceptical of this story I have to report that all my own children have been late cutters, my youngest daughter had no teeth at all at ten months, she had eight at twelve months and after a further lull she had her complete temporary dentition at twenty-three months. Returning to myself, I did not cut my lower wisdoms until I had turned forty although there was plenty of room for them, had I cut them earlier I might have escaped the meshes of the School Dental Service and been hobnobbing with my more affluent colleagues in private practice.

The theories of my predecessor in Barking on endocrine dysfunction were most interesting and should give material for later discussion, the influence of orange juice and cod-liver oil might also be factual but as Mr. Phillips points out it is concrete evidence that is required so that the textbooks may be amended accordingly.

Maybe, in the not too distant future, Miss E. Knowles might see her way clear to carry out one of her interesting surveys on this subject and thus bring the eruption tables up to date.

Thanking you for facilitating an interesting discussion.

Central Clinic, *Barking*. Yours faithfully, R. A. TRAN.

THE DENTAL CURRICULUM

SIR,—" Banbury Cross " and Mr. C. A. Scott-Samuel seem to be taking a short term view in urging a pruning of the Mechanics' course.

A dentist, incapable of turning out a high standard of prosthetic work, puts himself at the mercy of the dental technicians, and will have to accept, with a feeble protest, what these choose to give him.

The Old School—who learnt the hard way : 5 years of it—can give directions, with confidence and power, because, if challenged, they are able to carry out, themselves, those directions.

Could the advocated New School do that ?

I doubt it.

102*b*, *High Road*, *Wembley*. Yours faithfully, CHARLES S. LAFFERTY.

SIR,—I have no idea who " Banbury Cross " is, but his letter headed "The Dental Curriculum " of August 18, 1950, is complete nonsense.

It is well known that some of the best mechanical work put in mouths is made by the Dentist 1921 and those who served an apprenticeship outside the teaching hospitals: it is also well known that most of the recently qualified men, who have relied on hospital training only for their mechanics have little or no experience of

running workshops—hence the increased number of dental technicians to the profession working on their own accord : it is therefore my considered opinion that if the standard of teaching and examination in Dental Mechanics is lowered any further, not only will the standard of the dental technicians be lowered, to the detriment of the patient, but there will also be no dental surgeons with their own workshops, but a lot of shops which will make and fit dentures like fitting shoes : by the way it is very hard to find a decent shoe-maker these days.

Westholme, Yours faithfully,
134*a Sandgate Road*, GEORGE G. ELLIS.
Folkestone.

SIR,—While I agree with " Banbury Cross " that some revision in the amounts of time spent in dental curriculums on various subjects is perhaps to be recommended, the unsavoury publicity afforded to the dental profession by the Press, contra-indicates a shortened dental curriculum, and would be suicidal to ethical progressive dentistry, as the attraction would be to " get rich quick with less effort " types.

Three years is insufficient.

49, *Victoria Road*, Yours faithfully,
Mablethorpe, A. NOEL STANNARD.
Lincs.

ANNUAL MEETING DEMONSTRATIONS

SIR,—In the issue of the British Dental Journal dated August 18, 1950, the author of Notes and Comments devotes a paragraph to " Demonstrations at the Annual Meeting."

I fully expected to find correspondence concerning this in the subsequent issue of the Journal, but to my surprise I did not find any.

On re-reading the paragraph, I can only conclude that the author attended the Annual Meeting on the two days Wednesday and Thursday.

He observes that of the fifty-six demonstrations, six were of special interest to Public Dental Officers.

Despite adequate sign posting, it is woefully apparent that the author was unaware of the innovation—for the first time at any Annual General Meeting, of an exhibition devoted to the Public Dental Service which occupied the whole of the space of the Physiology (experimental) laboratory, was opened officially by the President of the British Dental Association on the Monday afternoon in the presence of the President Elect, the President of the Public Dental Officers' Group and the Dean of the Dental Faculty together with representatives from the various Midland Public Authorities and Public Dental Officers attending the Annual Meeting.

This exhibition, wholly devoted to the Public Dental Service, remained open during the whole period of the meeting and it was here that the six demonstrations referred to were staged ; further, these demonstrations were so arranged on a " staggered " time-table that each demonstration was shown twice.

Those with experience will realise the months of preparatory work required to stage so large and varied an exhibition.

It was exceedingly well attended and favourably commented on, but unfortunately missed by the author of Notes and Comments.

This letter is, therefore, for the information of those who were unaware of the existence of this exhibition and also to place it on record, amending thereby the paragraph already referred to.

134, *Great Charles Street*, Yours faithfully,
Birmingham, 3. E. DAVIES-THOMAS.

REVIEWS AND ABSTRACTS

BACTERIAL INFECTION. With special reference to Dental Practice. By J. L. T. Appleton, B.S., D.D.S., Sc.D. Professor of Bacteriopathology and Dean, The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania. Fourth Edition, thoroughly revised with 108 illustrations and 5 plates, 4 in colour. London : Henry Kimpton. 1950. Pp. 644. Price 70s.

The contributions of Appleton to medical and dental literature have been numerous and rarely is any work from his pen published without the hall-mark of pains-taking accuracy.

This volume is more a reference library than a text-book for students and the immense amount of reading matter within its pages makes the meal at times a little indigestible.

There is something to be said for the shorter more condensed textbooks of some English authors on the subject. A small nicely served up meal is at times more palatable than a feast of Lucullus.

There is no doubt that the student who reads this book right through carefully will obtain a very complete picture of bacterial infection and that after all is the object of the book. There is, however, the possibility that the length of the book may act as a deterrent to the student and that he will consult shorter textbooks in his quest for knowledge. According to some authorities the dental curriculum is too overloaded with academic subjects and such people might think that this book contains more information than is required by the dental student. Whether this criticism is justified is open to question.

The dental student should be as familiar with the general principles of infection as his medical confrère because only by acquiring this knowledge can they speak the same language and discuss problems of interest to both. After all infection is the same whether it applies to medical, surgical, or dental disease, and one can only admire the wonderful patience of an author who has gathered together so much knowledge of the subject into one volume. This book, in spite of its length, can be unhesitatingly recommended to both medical and dental students.

As stated in the preface the primary object of the book is to aid the reader to form a comprehensive concept of infection and the secondary object is to point out to the dentist that a knowledge of infection will help him to realise his opportunities and responsibilities.

There is no doubt about the views of the author on the

necessity of clinical and laboratory work as a complement to the knowledge gained by reading. The dental student in American dental schools is apparently at present much better catered for in the matter of bacteriology than his English colleague and much more time is occupied in the teaching of the subject.

In Part 1 the author gives a very complete account of the classification, cultivation, and identification of the various bacteria and includes a useful chapter on the filtrable viruses. The antibacterial action of chemicals and of certain dental materials is explained in detail. The chapter on chemotherapy is rather disappointing. Penicillin and the sulphonamide group of drugs do not get as much prominence as they deserve and in a book of this size a little more detail of the other antibiotics aureomycin and chloromycetin would have been welcome. The methods of sterilisation of dental instruments is adequate and the difficulties attending the sterilisation of dental hand-pieces and burs are mentioned.

Part 2 gives a very clear and comprehensive concept of infection as an entity and follows generally accepted lines. The principles of immunity are dealt with in the usual way and call for no comment. The chapter on the blood is welcome but would have been bettered had it included a little more detail on the special blood diseases such as the leukæmias in which the oral symptoms are so often marked. It is interesting to note that the author states that in chronic dental sepsis the red blood corpuscular sedimentation rate is hardly affected—if at all—a contention with which the reviewer cordially agrees.

The control and prevention of infectious diseases is of such paramount importance that it is good to see a chapter devoted to the subject. The future of medicine and dentistry alike undoubtedly lies in the province of prevention and prophylaxis.

Part 3 deals with the special infections of the oral cavity and so is of great interest to the dental student. In the chapter labelled the ecology of the oral cavity the author rightly stresses that a complete census of the micro-organisms present is as yet impossible. The variation of the flora and fauna in health and disease is well brought out.

The streptococcal-pneumococcal group of micro-organisms is of such great importance in dental infections that it is very fully described. The author is obviously of the opinion that the classification of this group is as yet far from satisfactory but he accepts Brown's classification as being the most useful to the dental student.

The chapter on the mouth spirochætes shows that the classification of this group is in even a more chaotic state than that of the streptococci and the possibly pathogenic role of these organisms is as yet " not proven."

The chapter on the bacteriology of caries embodies most of the newest work on the subject and is an advance on that found in most textbooks. The bacteriology of the dental pulp and the peri-apical tissues is fully described but English readers would have liked to have seen more reference to Fish's work on bone infection which gives a new approach to the subject. Methods of cultivation from the peri-apical tissues and the control of root canal therapy by bacteriological investigations is well described and the possible fallacies discussed.

In the chapter on periodontal disease the author states that calculus formation is, according to the available evidence, not a primary or essential factor in the disease. The benefit in treatment from the examination of the exudate expressed from the pockets is admitted.

The chapter on focal infection is a fair résumé of the accepted views and shows how difficult it is to incriminate a particular focus as being the sole or even the chief factor in systemic disease.

The treatment of Vincent's infection by penicillin is mentioned but the use of chromic acid is condemned.

The chapter on osteomyelitis is not very illuminating and the work of Wass in this country gives a much more accurate description of the disease and its treatment.

The last chapter, on the bacteriological aspects of oral hygiene, deals with the various methods adopted to prevent disease and is a very good chapter to conclude the book as prophylaxis and prevention should be the goal of all dental practitioners.

The general layout of the book, the paper used, and the illustrations and index are all excellent and the publishers are to be congratulated.

A Sulphated Mucopolysaccharide in Human Dentine.—The presence of a polysaccharide resembling chondroitin sulphate had been previously described by Pincus who now gives details of the procedure by which an undegraded polysaccharide with a low ash content has been separated from human dentine. From 1 gm. of dry dentine the yield of polysaccharide was 26·4 mgm. This material has been hydrolysed (a) by a dried preparation of a Gram-negative bacillus from dental caries; (b) by a living culture of penicillium spinulosum at room temperature; (c) by 2N hydrochloric acid in 10 hr. at 100° C. Before hydrolysis neither free sulphate nor hexosamine could be detected, but both were found after hydrolysis by any of the three agents mentioned above. Despite repeated attempts, it was impossible to free the polysaccharide completely from traces of protein without degradation of the polysaccharide occurring.—PINCUS P., *Nature, Lond.* (1950), **166,** 187.

The Softening and Solution of the Dentine in Caries.—Animal and human dentine was dehydrated in the frozen state and sections cut without previous decalcification. In the procedure chosen, only glycogen and glycoproteins were likely to stain by the Hotchkiss method with the leuco-fuchsin reagent after periodate oxidation. Adult dentine did not stain unless it was carious, when various micro-organisms containing glycoproteins were also demonstrated. Sections of rat teeth (1-16 days old) were treated with collagenase and hyaluronidase preparations which depolymerize their connective tissue substrates. Only the former enzyme, of a number present in the *Cl. welchii* filtrate employed, was effective at pH 7, the predentine being dissolved particularly rapidly. Slices of human dentine were not depolymerized by *Cl. welchii* filtrates unless modified by caries or decalcification (cf. *Brit. dent. J.*, **88**, 253), judging by measurements on the soluble nitrogen of incubated preparations. Physical evidence of the softening of dentine under such conditions was obtained with a lever indicator. Slices incubated with collagenase stained peripherally by the Hotchkiss procedure. Extracts of carious dentine were shown to possess collagenase activity by using a hide

powder to which a red dye had been coupled by diazotisation. Release of the dye by depolymerization at pH 6·2 occurred within an hour if the filtrate was previously incubated for a day to allow growth of the micro-organisms, otherwise 1-4 days were required. The extracts also depolymerized decalcified dentine, and the glycoprotein of rat duodenum goblet cells. Hyaluronidase activity was then detected by viscosimetry and by the spreading reaction, the relative viscosity of 0·2 per cent sodium hyaluronate being halved in 3-700 minutes at pH 6·2. It is thought that the hydroxyl groups of adult dentine glycoprotein cannot react with periodate because of the extent of depolymerization. This is less in deciduous dentine, so that the resultant increased action of bacterial collagenases may explain the more rapid progress of caries in children. Interference with such enzymes by inhibitors or antienzymes is suggested in caries prophylaxis.—ENGEL, M. B. (1950) *J. Amer. dent. Ass.*, **40**, 284.

Gingival Clefts and Associated Tracts.—Sharply cut clefts of varying extent are frequently present at the gingival margin. They present fine linear depressions or grooves, and Stillman, after whom they are named, regarded traumatogenic occlusion as the predominant causative factor. They are associated with parodontal pockets. Box has re-examined his serial sections of 3 specimens of pathological gingivæ which show these clefts. The clefts formed tracts which extended deeply into the corium but in only one case did the tract actually reach the bone. The tracts cut across the bundles of collagen fibres which stained less deeply with eosin in the region of the tracts. The course of the tract appeared to be mainly at the expense of the cement substance (chondroitin sulphate) between the fibres. The clefts were filled with desquamated epithelium, red blood cells and clumps of micro-organisms of filamentous type together with cocci and bacilli. The tracts were partially and irregularly lined by epithelium, islands of which were found in the deepest part. There was a striking absence of an inflammatory cell infiltrate in the adjacent tissue. In the one case, in which the bone was reached by the tract, colonies of organisms were situated on the bone surface which was eroded and fragmented and there was evidence of organisms and epithelial scales within thin-walled vessels in the Haversian canals, vessels which it was concluded were lymphatics.—BOX, H. K. (1950) *N.Y.S. dent. J.*, **16**, 3.

THE HEALTH SERVICE

PARLIAMENTARY INTELLIGENCE

Chemists, Scotland—Remuneration.—In a written reply to a question in the House of Commons on September 18, 1950, the Secretary of State for Scotland stated :

" On examining the payment which had been made to chemists during the recent period I formed the opinion that their rates of remuneration were too high and should be reduced. Negotiations were accordingly begun on the Whitley Committee and these are continuing.

" In the meantime, and as a purely temporary and provisional arrangement to protect the taxpayer, I have made a reduction of 8 per cent in the payments otherwise due, since should negotiations or arbitration eventually lead to a reduction in the rates of renumeration I must have a legally competent method of implementing such a reduction retrospectively.

" I regret that a considerable number of chemists have given notice of withdrawal from the National Health Service to take effect at the end of November. I cannot agree that this extreme action is warranted. I understand that the chemists' representatives do not object to the principle of retrospective application of any reduction in remuneration that may follow Whitley Council discussions, but that they do object to the method by which the provisional cut has been made. I have been advised, however, by my legal advisers that the only course open to me to achieve the end in view effectively and equitably was the one I have followed. I would emphasise that the cut is meantime a purely temporary arrangement which will in due course be superseded by such permanent amendment, if any, as may be required to give effect to the result of negotiations or arbitration.

" I would appeal to all chemists to weigh carefully his explanation again given and consider whether the very small difference of opinion between us on method justifies their withdrawing their services before the result of negotiations or arbitration is known. I should greatly regret, as I am sure the chemists would, any inconvenience caused to the public by any hasty action on the part of the members of a profession who have hitherto given the community loyal and efficient service.

" I propose to invite the representatives of the chemists to meet me in the near future."

DENTIST EXCLUDED FROM SERVICE

THE Tribunal constituted under the National Health Service Act has ordered that the name of Mr. William Barnes Walch of Darlington shall be removed from the Dental List of the Executive Council of Darlington. The Tribunal found that Mr. Walch had certified in Part V of Dental Estimate Forms: that he had supplied full upper and lower dentures to two patients and received payment for them, whereas, in fact, he had not supplied any denture in either case. In one case dentures were supplied eleven months and in the other five months after the respondent had received payment for them, and the Tribunal was satisfied that the dentures were only supplied then because Mr. Walch had been required to appear before a Dental Services Committee. The Tribunal further found that the respondent had failed to keep records of his National Health Service cases. Mr. Walch was ordered to pay the costs of the Executive Council. He appealed against the findings of the Tribunal but his appeal was dismissed by the Minister of Health.

Public Dental Service

SCHOOL HEALTH SERVICE REPORTS

City of Birmingham School Health Service, 1949

MR. E. DAVIES-THOMAS, Chief Dental Officer, states in his report for 1949 that the school population of Birmingham is approximately 160,000, that the approved establishment of dental officers is only 12, and that the number of dental officers actually employed during 1949 was " practically nine," plus the Chief Dental Officer. Under such deplorable staffing conditions it is not surprising that the statistics show that less than one-third of the school population received a routine dental inspection during the year ; that nearly 27 per cent of the children treated were " casuals " who sought treatment because of pain or other urgent condition ; that the number of permanent teeth which had to be extracted was no less than 10,514, and that the number of fillings

inserted in permanent teeth was only 11,587, in spite of the fact that 31,361 individual children were treated. The average number of " gas extraction " sessions held weekly was 22.

No dental officer resigned from the staff during the year, and in regard to this matter Mr. Davies-Thomas says :

" I am in a more fortunate position than were many of my colleagues in that my staff have remained loyal to the School Dental Service despite the lure of much greater financial reward in private practice under the National Health Service, and I feel that this loyalty is appreciated by the Authority, for it has entailed considerable sacrifice."

Mr. Davies-Thomas continued, during 1949, his Anthropometrical Survey, and by the end of the year 3,811 children had been included, but the survey has not yet been completed ; he also gave tuition on dental subjects (as in former years) to Student Health Visitors and to students taking the Home Office courses for the training of House Fathers and House Mothers for duties in Children's Homes.

The fact that Mr. Davies-Thomas holds the post of Senior Consultant Dental Surgeon at the Children's Hospital, Birmingham, considerably assisted the closest co-operation between the School Dental Service and the dental service available at the Children's Hospital, and there was also close and helpful co-operation from the Birmingham Dental Hospital.

During the year Mr. A. J. Walpole Day was appointed as Consultant Orthodontist, but had not taken up his appointment by the end of the year. A most interesting innovation (as far as Birmingham is concerned) which took place during the year was the introduction of a scheme by means of which the School Dental staff undertake dental treatment for patients referred by the Maternity and Child Welfare Department. In former years there have been two separate and distinct dental staffs in Birmingham, and it is, therefore, pleasing to see that there has, at last, been co-ordination of these two services.

The report of Mr. Davies-Thomas is most interesting, and there can be no doubt that given adequate staff, the progressive ideas which have been introduced would soon result in a very efficient dental service for the priority classes in Birmingham. The treatment statistics convey that the available staff worked hard during 1949, but nine dental officers cannot be expected to deal effectively with a population for which at least forty dental officers are required.

Dental News

THE ODONTOLOGICAL MUSEUM

THE Council of the Royal College of Surgeons have appointed Professor A. E. W. Miles, F.D.S., L.R.C.P., M.R.C.S., as Assistant to the Honorary Curator of the Odontological Museum. Professor Miles is Professor of Dental Pathology at London Hospital Medical College and Scientific Editor of the BRITISH DENTAL JOURNAL.

SCHOOL DENTAL OFFICERS PRIVATE PRACTICE

SINCE September 1949 school dental officers employed by the Oxfordshire County Council have been permitted to work under the National Health Scheme in their spare time. This was a provisional arrangement for one year, pending the outcome of salary negotiations on a national basis. The Special Services Board of the Education Committee have now recommended that as the salary negotiations have not been completed the arrangement should be extended for a further period.

TOWN AND COUNTRY PLANNING ACT 1947

DENTISTS who are about to set up practice, or to move their surgeries, or to undertake any structural alterations to them may find that they are affected by the provisions of the Town and Country Planning Act and the many Regulations made under it.

Under the Act any person who " develops " any property must generally obtain the consent of the local planning authority, and pay a development charge to the Central Land Board beforehand.

A person develops property if he :—

(i) Builds upon it.

(ii) Extends an existing building or carries out exterior alterations to it.

(iii) Makes a material change in the use to which it is put ; for example if he sets up a shop in the whole of what was a house.

PLANNING PERMISSION

A dentist intending to develop any property in this way should therefore apply in the first place to his local authority for planning permission. The local authority will decide upon the application in the light of the development plan for the area. This development plan sets aside certain zones for use of a particular kind (e.g. business ; residential ; industrial). If planning permission is refused by the local authority the applicant may appeal to the Minister of Town and Country Planning.

It may happen that a dentist seeks planning permission to use as a dental surgery what has hitherto been a house. If the proposal is to use only a part of the house as a surgery, with the dentist living in the remainder, the local authority may decide that this will involve no *material* change of use and that their consent is accordingly not required. The decision is, however, one for the local authority to make in the light of all the facts and dentists who are intending to take new premises for a surgery where one has not existed before should therefore always seek the opinion of the local authority. It is most important in their own interests that they should seek this opinion *before* they enter into any commitments regarding new premises. Otherwise they may find themselves in occupation of premises which they are forbidden to use for the purposes of a surgery.

DEVELOPMENT CHARGE

If planning permission is necessary and is granted a development charge may also be payable. No charge is levied where planning permission is not required.

This charge is assessed by the Central Land Board, and is related to the increase in value which accrues to the property because planning permission has been granted. In some cases this increase may be nil and in these cases the development charge will be nil too.

The Act and Regulations exempt certain kinds of development from development charge and in some cases dentists will be able to get the advantage of these exemptions. There is however no general exemption for dental practitioners.

There is—unfortunately as some think—no appeal against the Central Land Board's assessment of a development charge. Members who find themselves liable to pay a charge would be very well advised to consult a valuer forthwith. In the cases which have come to the Association's notice, valuers employed by members have often been able to secure substantial reduction in the development charges proposed by the Central Land Board in the first place.

CO-OPERATION BETWEEN DENTISTS AND TECHNICIANS

A LECTURE will be given by Mr. W. Kelsey Fry on "The Need for Co-operation Between the Dental Surgeon and His Technicians" under the auspices of the Institute of British Surgical Technicians (Dental Section) on Tuesday, October 24, 1950, at 6.30 p.m., at St. Ermin's Hotel, Caxton Street, London, S.W.1. Admission tickets are obtainable on sending stamped addressed envelope to the Institute of British Surgical Technicians, 6, Holborn Viaduct, London, E.C.1.

The Schools

London University.—Professor E. K. Tratman, M.D.S. Brist., F.D.S. R.C.S., F.S.A., has been appointed to the University Chair of Dental Surgery tenable at University College Hospital Medical School, from October 1, 1950.

University of Birmingham.—It is reported that there has been a very considerable increase in the number of candidates for admission to both the Medical and Dental Schools of the University. Commenting on the "recent rush of young men—and an increasing number of women—to enter the dental profession," Mr. Grant, Registrar of the University, is reported by the *Birmingham Mail* to have said :

"There appears to be a general lifting of standards. What happened here was that the University authorities decided to change the dental course, which did not previously demand even a matriculation as minimum attainment, so that instead of being a diploma course every candidate must now do a course for his B.D.S.—Bachelor of Dental Surgery. The former, and slightly shorter, course for a diploma is being terminated.

"Because insufficient notice of this change was given, the new attainment level for admission was not to be enforced this year, but the number applying for places was so great that it meant we were still able to select only the best candidates, all of whom fulfil the new conditions."

Examination Results

University of Sheffield.—*Final B.D.S.*—T. C. A. O'Neil J. E. Swindells. *Final L.D.S. Examination.*—S. H. Alexander, C. P. Bain, J. Batty, J. E. Bentall, Joan Egan, B. N. Kington, K. R. Needham, M. B. Wilson.

The Charge for Announcements of Births, Marriages and Deaths is 2s. 6d. per Line. (Approximately 8 words.) Minimum 7s. 6d.

Births

FULLER.—On September 10, 1950, to Ruth, wife of Surgeon Commander (D) Athelstan C. Fuller, V.R.D., R.N.V.R., of 97, New Church Road, Hove 3, Sussex, a daughter.

MORGAN.—On September 16, at 13, Angel Hill, Bury St. Edmunds, Suffolk, to Joan (*née* Baylis) wife of L. Grant Morgan, L.D.S. R.C.S.Eng., a daughter.

VERNON-ALLEN.—September 10, 1950, at the Memorial Hospital, Harpenden, Herts, to Hazel (*née* Adams), L.D.S.R.C.S. Edin., wife of Lieut. J. Vernon-Allen, L.D.S. R.C.S.Edin., O i c 913 Army Dental Centre, Hong Kong, a daughter, Carolyn Mary.

Marriage

BROWN—NICHOLAS.—On September 2, 1950, at Christ Church, Alsager, Cheshire, Ian Cameron Brown, B.D.S., of Edgbaston, Birmingham and Hartford, Cheshire to Eirlys Myfanwy Nicholas of Alsager.

Our Diary

Thursday, Friday and Saturday, October 5, 6 and 7.

Eastern Counties Branch.—Annual Meeting, Field House, Grimsby. Thursday : 8.30 p.m., Council Meeting. Friday : 10.30 a.m., Annual Business Meeting ; 11.45 a.m., Annual General Meeting ; 2.30 p.m., "Pathology and the Dental Surgeon," F. Hampson ; 8 p.m., Dinner and Dance. Saturday : 10.30 a.m., "Current Dental Topics," J. Lauer.

Friday, October 6.

The Royal Dental Hospital of London, School of Dental Surgery.—Annual Prize Distribution, 8 p.m. Sir Cecil Wakeley, *K.B.E.*, will present the awards.

Surgical Instrument Manufacturers' Association—Croydon Branch.—Norbury Library Hall, 7.30 p.m. Tickets from Hon. Sec., H. J. Nowers, 86, Croydon Road, Croydon.

Friday and Saturday, October 6 and 7.

Southern Counties Branch.—Annual Meeting, Lion Hotel, Guildford. Friday : Council Meeting. Saturday : 10.30 a.m., Business Meeting ; 1 p.m., Luncheon ; 2.30 p.m., Valedictory Address and Inauguration of President. "Practical Application of Recent Research Work on the Dentine," Professor E. B. Manley.

Northern Ireland Branch.—Annual Meeting, Ulster Medical Institute, College Square North, Belfast. Friday : 7.30 p.m., Address by H. T. Roper-Hall. Saturday : Morning, Golf Competition.

Monday, October 9.

The British Society for the Study of Orthodontics.—Manson House, 26, Portland Place, London, W.1, 7.30 p.m. "Studies in the Development of the Mandible," N. B. B. Symons.

The British Society of Periodontology.—Institute of Dental Surgery, Eastman Dental Hospital, Gray's Inn Road, London, W.C.1, 5 p.m. Presidential Address, C. de Vere Green.

Tuesday, October 10.

Wolverhampton and District Section.—Royal Hospital, Wolverhampton, 8 p.m. "Recent Advances in Operative Dentistry," E. L. Hampson. Preceded by informal dinner at Star and Garter Royal Hotel, Wolverhampton, at 6.30 for 7 p.m.

Wednesday, October 11.

Continental Dental Society.—Eastman Dental Hospital, Gray's Inn Road, London, W.C.1, 8 p.m. "Points of Interest in surgical procedure," F. Fraser.

Thursday, October 12.

University College Hospital Dental Society.—Medical School, Gower Street, W.1, 7.30 p.m. Two films of Dental Interest, "Signs and Stages of Anæsthesia" and "Gold Inlay Technique."

Thursday to Saturday, October 12–14.

Central Counties Branch.—Annual Meeting, Birmingham Medical Institute, Great Charles Street, Birmingham. Thursday : Golf Competition, Brocton Hall Golf Club, 2 p.m., preceded by Lunch, 1 p.m. Friday : Annual Dinner, Midland Hotel, New Street, Birmingham, 7 for 7.30 p.m. Saturday : Annual Meeting, Birmingham Medical Institute, 10 a.m., followed by Luncheon at the Midland Hotel, 12.45 p.m.

Friday, October 13.

Oxford Section.—Radcliffe Infirmary Committee Room, 8 p.m. "General Principles of Fixed Bridge Work," D. C. Dewe Matthews.

Friday and Saturday, October 13 and 14.

Yorkshire Branch.—Annual Meeting, Royal Victoria Station Hotel, Sheffield.

Wednesday, October 18.

Hounslow and Twickenham Section.—"The Jolly Gardeners," Isleworth, Middlesex, 7 p.m. Inaugural Dinner Meeting.

Thursday, October 19.

Metropolitan Branch.—13, Hill Street, Berkeley Square, London, W.1., 7.30 p.m. "The Self-Polymerising Resins : a review of current Techniques and Acrylic Filling Materials," J. W. McLean.

Friday and Saturday, October 20 and 21.

British Dental Association.—Representative Board, 13, Hill Street, Berkeley Square, London, W.1. Friday, 2.30 p.m.; Saturday, 10 a.m.

Monday, October 23.

The Royal Society of Medicine—Section of Odontology.—1, Wimpole Street, London, W.1, 5.30 p.m. Presidential Address: "The evolution of oral surgery," W. Kelsey Fry.

Friday, October 27.

Central Counties Branch.—Joint Meeting with the Birmingham Dental Students' Society, Birmingham Medical Institute, Gt. Charles Street, Birmingham, 7 p.m. "A System of Bridgework," A. R. F. Thompson.

Guildford and District Section.—The Lion Hotel, Guildford, 8 p.m. "Paradontal Disease and Treatment," Dr. E. Wilfred Fish.